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MODEL AIRPLANE NEWS

JAY P. CLEVELAND
Publisher

APRIL 1947 VOL. XXXVI No. 4

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THE NAVY has revealed the second supersonic research airplane, Douglas D-558 *Skystreak*, which joins the Bell XS-1 in the attack on the sonic speed barrier. The *Skystreak*, however, is totally different from the XS-1 although designed to produce essentially the same information. The new speedster is powered by a General Electric TG-180 turbojet engine which enables the plane to take off under its own power. Basic idea of the *Skystreak* is to test the value of low aspect ratio wings as a means of minimizing the effects of the transonic zone. The XS-1 was designed primarily to test the usefulness of very thin wings. "Another airplane", believed to be the Bell XS-2, will test sweepback wings in the transonic zone. The *Skystreak* is of magnesium construction. The nose assembly, carrying the pilot, may be detached in mid-air permitting the pilot to slow down and escape by parachute in event of difficulty. The new plane, like the XS-1, is scheduled to be turned over to the National Advisory Committee for Aeronautics for the research work for which it was built following routine acceptance tests. It will be delivered this spring to Muroc Army Air Base where the first test flight will be made. About six different sonic research airplanes are being built for NACA, which is taking the world lead in the attack on the sonic barrier, which many believe to be the most critical problem now facing aviation.

MORE DETAILS are available on the two Curtiss jet projects. The XA-43 is a single seat attack version powered by four General Electric TG-180 turbojet units mounted in pairs in flat, rectangular nacelles in each wing. It is equipped with slots and flaps. Armament includes a 37 mm cannon and ten .50 caliber machine guns. A similar version is the XP-87, which is powered by two turbojet units and will mount special equipment for "all weather" operations.

FIRST TEST flight of Northrop *Pioneer* tri-motor transport plane has been completed successfully and photographs reveal the "antique" design as smart and modern in appearance. Max Stanley, who flew the monster XB-35, was the test pilot and he "took it easy" on the first flight using 1000 ft., although the design is capable of taking off in 700 ft. Another reason is the fact that three Pratt & Whitney *Wasp* engines of 600 hp are installed at present instead of the 800 hp Wright *Cyclone* engines which will eventually be used. The *Pioneer* was built specifically for Latin American export trade where small field capabilities are at a premium. Northrop plans to test the airplane thor-

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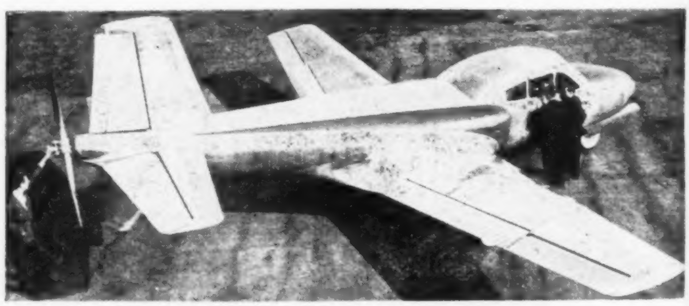
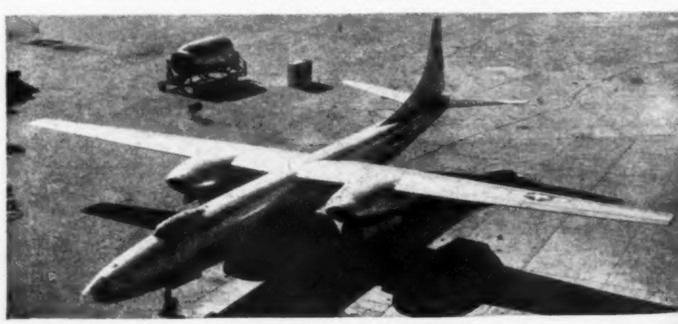


(Above) Douglas *Cloudster*, deluxe private or executive ship, has two 250 hp engines driving single tail prop. (Below) Sleek new 4 jet bomber Consolidated Vultee XB-46 has span of 106 ft.



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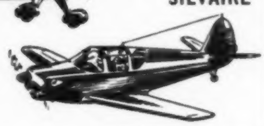

GLOBE SWIFT

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CURTISS P-40 "WARHAWK"

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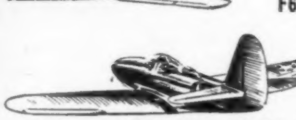

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(*Continued from page* 2)

oughly around local Southern California fields, particularly the small rough ones (of which there are plenty!), after which an extended sales tour of Central and South America will be made.

THE FIRST jet-propelled flyingboat in England, the Saunders-Roe SR/A1, is nearing completion. The craft is a single-seat Navy fighter craft powered by two Metropolitan-Vickers F2/4 axial flow turbojet units mounted at the wing-hull junctures. Air is provided through a single inlet in the extreme nose. The small craft has a wingspan of 46 ft. and is 50 ft. long. It is hoped that success of this design will reinstate the much-maligned flyingboat in the aircraft picture. The use of turbojets insures its qualification in the 500 mph class with other fighter planes. The British point out the advantages of the turbojet flyingboat in South Pacific operations, for example, where use of land-based fighters required extensive landing facilities laboriously installed.

EMERGENCE OF France from its wartime aeronautical "tomb" to a prolific source of new aircraft designs was made clear at the Paris Aero Show. It was obvious from the more than 30 new designs on display that the state-controlled industry has no intentions of being dominated into set patterns or that research will lag. Included were four supersonic research airplanes, all with sweepback wings and jet power: the Aerocentre N.C.271 (two Rolls-Royce *Nenes*), the Aerosudouest SO M1 (Rolls-Royce *Derwent*), the Arsenal VG 70 (Junkers Jumo 004) and the S.N.C.A.S.E. SE 2400 (two Rolls-Royce *Nenes*).

MORE DETAILS and photographs are now available on the long-rumored Curtiss XF15C-1 single seat Navy fighter plane. It is a combination reciprocating-jet engined design with propeller located in the nose and the jet engine in the lower fuselage underneath the tail. The reciprocating engine is a Pratt & Whitney *Double Wasp* R-2800 driving a four bladed propeller enclosed in a large spinner. The turbojet unit is a Halford H-1B unit of British design manufactured by Allis-Chalmers. A distinctive feature of the XF15C-1 is the location of the horizontal tail surfaces (believe it or not!) on *top* of the fin. A tricycle landing gear is used with the nose gear folding rearward and the main gear folding inboard into the wing centersection. The pilot is located in a bubble canopy. Three of the unorthodox fighters have been built for the Navy for experimental purposes and no plans for production have been announced.

THE LONG-AWAITED Ryan Super *Fireball* has been revealed as a standard FR-1 fighter with a turboprop unit mount-

(*Turn to page* 84)

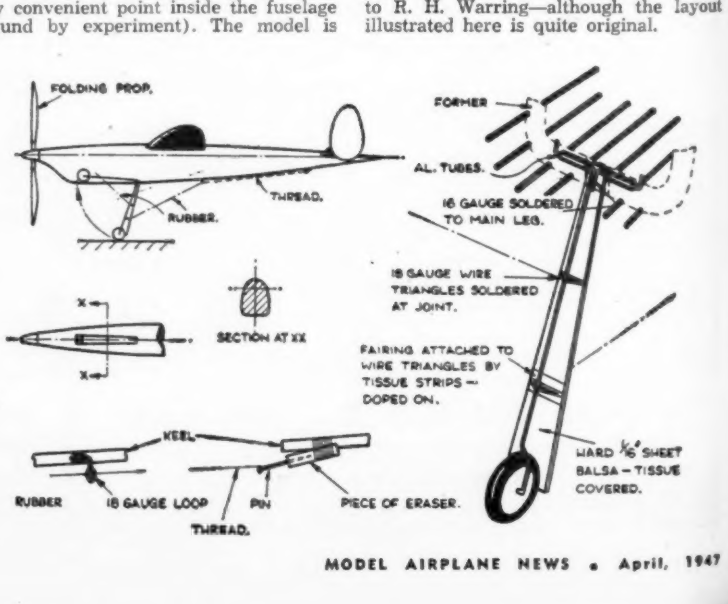
RETRACTING SINGLE LEG UNDERCARRIAGE

By Bill Dean

MOST retractable undercarriages rely on the rubber motor to operate them. This is rather complicated in action and usually calls for much constructional ingenuity. In the diagram, a "peg-leg" type is shown which operates quite independently from the motive power. It works like this—*always!*

The single leg is held down by a piece of rubber and thread stretched backwards to the tail, where it is anchored by a pin pushed into a piece of india rubber. The backward movement is limited by the upper part of the undercarriage bearing against one of the formers. Another strip of rubber (weaker than the first) is also tied to the leg and stretched up to any convenient point inside the fuselage (found by experiment). The model is placed in this condition on the ground and takes off in the usual manner. All the time the pin at the tail is gradually being pulled out of the india rubber by the rear rubberband. Finally it comes free and the leg is pulled forward and up into the fuselage by the front band. Meanwhile the pin on the end of the piece of thread is brought to a stop when it reaches a small wire loop set midway up the fuselage. When retracted the hole in the fuselage is covered by a door fitted to the undercarriage leg. The only external mechanism left is that of the rubberband and thread.

Credit for thinking of using a piece of india rubber to delay the operation goes to R. H. Warring—although the layout illustrated here is quite original.



Model Airplane NEWSLETTER

by AL LEWIS

THE age-old question of pylons versus conventional appearing free flight gas models is being raised again as the new contest season approaches and more modelers tune up their engines and trim up their planes.

Latest exponent of the "prototype" free flight gassie to step forward and declare himself in no uncertain terms is the well-known model builder and flyer, Jack Luck of Montreal. Mr. Luck is well known to MODEL AIRPLANE NEWS readers as the designer of some outstanding craft. He is an industrial designer by profession and an individual to be reckoned with when it comes to reasons why models do or do not perform and just what makes a model behave.

This Canadian expert comes out flatfootedly and says the current regulations are downright unworkable and even dangerous. With the advent of the more powerful postwar engines, designer Luck contends that wing and power loadings should be raised—and immediately!

It is a fact that a number of discerning activity leaders and well known designers have been thinking along the same lines. Although the actual thinking of the A.M.A. contest board is not known at the time this is written, it is a matter of record that some members have been advocating a stepped-up requirement for the larger size models. Proponents of increases mention 80, 90, and 100 ounces per cubic inch for Class A, B, and C power loadings respectively, and 7, 8 and 9 ounces per 100 square inches of wing loading.

The Northwest gas clubs are already flying with 120 oz. per cu. in., but reports indicate that models still continue to go out of sight. It's a lot like the weather—everybody talks about the subject but nobody ever runs comparative contests.

But back to Jack Luck and his idea that what this country and Canada need are more realistic-looking models. Of course, in this age of supersonic experimentation it is somewhat difficult to predict what next year's aircraft will look like, so maybe there are arguments against conventionality, too. However, it must be conceded that a lot of model aeronauts are turning to scale model craft flown on control line so obviously the trend is in that direction. Frankly, we can think of nothing finer than to see a slick scale model take off, circle around the "pilot" and go into a series of stunt maneuvers. That's what we call real modeling. And if the other fellows want to continue with free flight—why, let them set the wing up off the fuselage on a step ladder if they so desire.

Of course when Jack mentions the safety angle he gets our attention, because a number of folks have been plugging safe flying

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for years. We think that increased wing and power loadings for the larger classes would do what Mr. L advocates—automatically produce better, cleaner designs more along the lines of what existing full scale jobs look like.

Only recently we heard one "oldtimer" discussing the famous K-G gas model during its appearance at the St. Louis "Nationals" back in '35. He described Charlie Grant and Joe Kovel running alongside the model and steadying it while it gathered speed gradually and became airborne. "Like a transport," he said.

Ah, the good old days.

* *

A VAST nationwide program of model contest and club sponsorship has been launched by the American Legion, and it represents one of the most comprehensive plans for the development of model aviation ever attempted.

The Legion entered the air-modeling picture through the efforts of the Institute of Air Age Activities. The veterans organization "will sponsor local, county, district, state, regional and national model airplane contests under rules and sanction of the A.M.A. of Washington, D.C."

Initial Legion announcement set forth its plan stating: "The American Legion believes that through this nationwide model airplane program it can provide wholesome activities for at least 5,000,000 teen-age boys. Any boy with a jack knife and 15 cents can participate. The program will include building of control line and free flying plane models. It will include rubber-powered models, hand-launched, and tow-launched gliders. There will be 14 different events."

Where existing sponsorship is available to local and state meets, the Legion will assist if the currently active leaders desire. Where no organized meets have been held, it will initiate competition and provide

prizes. Expense-paid trips to the National meet are a feature of the nationwide plan. These trips will go to state champions who will compete in the National finals the third week in August. By the time this reaches print the locale of the meet will probably have been definitely decided upon.

* *

AMERICAN MODEL AVIATION lost one of its great leaders last January when Glen Rymer of Akron, Ohio, was killed in an airline crash in Virginia. Sadly enough, Mr. Rymer was flying to Miami, Fla., to co-direct the winter control line championships there. He had been the sparkplug behind a revitalized model aircraft program in Akron and around him had rallied many former leaders and champion flyers. Last September in Wichita at the annual meet-

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WEST COAST TIPS

by JOHNNY DAVIS

THIS month we are going to give some unsung heroes a boost. In California the sun shines all winter long (so our earnest Chamber of Commerce says) hence there isn't much activity out here that is driven indoors. Therefore, if a model fan goes to the extreme trouble of making an indoor job, we believe he is a hero.

For years there hasn't been a decent indoor location in or near Los Angeles where this exacting work could be carried on. San Francisco, Oakland and San Diego all have some place to fly, yet the highest flight times consistently come from the Los Angeles area. This fact has long baffled the experts who always try to figure the form sheet. But the answer seems to be . . . perseverance.

The famous "Hatchetmen," Ed Abacharie and Don Gulotta, who won Western Open Team event and have been strong winners since

This ability to stick with their slow-moving crates is just now about to pay off—in a big way, that is. If everything stays copisettie, the U. S. Naval Air Station at Santa Ana may become available to modelers in the Los Angeles area.

This Navy Station has, among its spacious acres, two of the biggest blimp hangars in captivity. The inside dimensions are 1000 ft. long, 500 ft. wide, and 186 ft. high, which is some pumpkins for indoor flyers. All they need is about 200 sq. ft. of that floor space and—Easterners look out for indoor records, too!

There has been some activity all winter in places like the National Guard Armory with a 40 ft. ceiling, and the Angelus Temple which has a high ceiling but has seats all over—however, with a beautiful spot like the blimp hangars, those microfilm jobs would never come down.

Credit for pushing a lot of the indoor builders into motion goes to Bill Atwood and Art Snyder, two of the real oldtimers. Frank Cummings, Don Donahue, Bob Holland and Ted Just are the boys who are right at the top of the ladder in flight times.

Those interested in doing this type of work should contact any of the above mentioned fellows for information as to time, place and location of their various flying sites for the present.

• •

Last week we ran across a new trend for free flight handicapping. In the California area—and we presume this is prevalent any place in the country where many free-flight contests are held within a given area—the same names appear in the winner's circle with monotonous regularity. Somehow the same guys always pop up to grab a trophy.

In order to add more interest, an idea for handicapping the experts has been brought forth. It simply consists of cutting down the top man's engine run a second each time he places first in a contest. This would work as follows: John Doe wins first place with a what-zit powered by a what-you-may-call-it. On the winning flight he used a 20 second motor run. This is duly recorded. At the next contest his engine run is cut down one or possibly two seconds, thus theoretically cutting down his amount of suds and making him work to beat the other boys. After he has fallen below third place for two consecutive contests he may be restored to his original motor run length, or if he keeps winning he keeps getting cut down.

So far as we can see this idea has merit, but it hasn't been thought out far enough. For instance, we can see the old hotshot boys "pointing" for the big contests by getting beat in the two or three preceding contests and then coming up on the big day with a full 20 second run against a plainly inferior airplane which, because its owner hadn't figured ahead, is now handicapped with an 18 second run.

Nope, the idea is fine but it doesn't go far enough. We would rather see another set of classes started which would automatically advance each contestant by his ability, the same way the A.A.U. works. In the Amateur Athletic Union, an athlete who, shall we say, is twelve years old, is a junior. But after he has won the junior event just once, he becomes a senior in that event. If he wins the senior event just once, even if he still is twelve years old, he now competes against the open class. If he still wins, he steps into the highly expert professional

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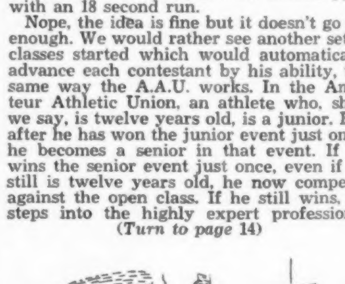

"A bit too realistic, don't you think?"

Old timer Zip Grandell with beautiful all metal P51 built with Pete Engel. Motor is an original design .60 which turns the large prop at about 10,000 rpm

(*Continued from page 12*)

class and usually is considered tops. However, being hot on the right day to beat a senior or open athlete is quite a problem and usually takes a few years.

The big advantage for this type of grouping is that it is a great leveler of ability in any one class.

In the junior class every contestant will be competing against someone else who has never won a first place in junior competition. Therefore, you would have a "new name" winner at each contest.

The same would be true of the senior and the open class. The only class which could be tied up at all would be the expert or pro class, and when you get a bunch of experts together anyone can catch a thermal.

We would appreciate comment on this type of ability rating, and if anybody should try it out we will be glad to publish the result.

• •

While we are on the rules question, here is one for you control-line speed fans to mull over. How about breaking up the racing classes into sleeve-bearing and ball-bearing classes?

In other words, there are lots of fellows who have sleeve-bearing engines who would probably like to race just as much as the fellows who have the superhot ball-bearing engines. However, it is a little silly to race an engine with a sleeve-bearing against a ball-bearing hot shot. Everything being equal, the ball-bearing engine will just naturally walk away from the sleeve-bearing job because of the power lost due to friction in the sleeve-bearings. By the same token, the sleeve-bearing engine is, generally speaking, ten to twenty dollars chaper than the rugged customer with ball-bearings.

Just the same, whether a fellow has an enlarged pocketbook or a shrunken one the urge is still there to race against competition, and there is no reason why a modeler should be barred by the size of his pocketbook.

'47 NATIONALS!

JUST as we go to press, we hear officially that the big event this year will be held Aug. 18 to 22 at Minneapolis, Minn. See further details of this flash in the May issue of MODEL AIRPLANE NEWS.


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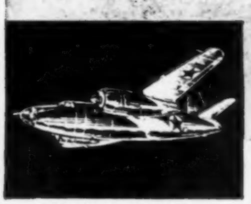

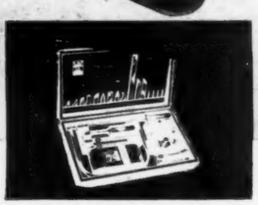

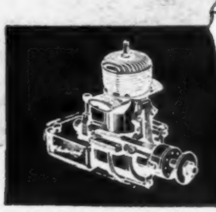

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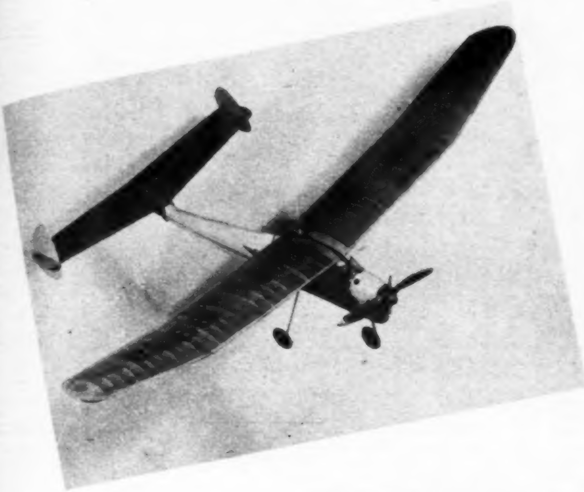
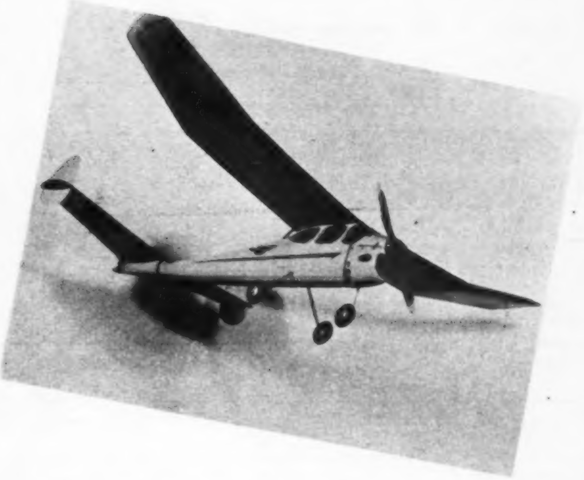




THE GHOUL

by DON McGOVERN

IN THIS issue we shall endeavor to fill the gap that exists between the pylon type contest designs and the more realistic or semi-scale models. With the rules specifying that the model be of the cabin type, and weighing not less than 7 oz. per hundred sq. in., it is evident that the familiar contest design with a light wing loading and high pylon is efficient but illegal.

The Ghoul is an attempt to meet and utilize these rules to the greatest advantage, incorporating both realism and contest performance in a graceful stable design. An attempt was also made to break the usual monotony in the appearance, hence the twin V tail and the optional tricycle landing gear. The present wing loading requirements permit additional strength in the framework and extra batteries if so desired.

If your Class B engine is collecting dust, it's high time you pulled out the razor blades and dried up glue and started work.

The first necessary step in constructing the *Ghoul* is enlarging the plans to full size. This often discourages some, but it shouldn't because there is nothing difficult in the procedure. Both plates are drawn to 1/4 scale and may readily be enlarged with a pair of dividers. For the rudder outline and the fuselage sideview, the page can be ruled in 1/8" squares, corresponding to 1/2" squares on the full size drawings. This technique will enable you to reproduce the most difficult curves exactly. It may also be used on the wing ribs and wing tips.

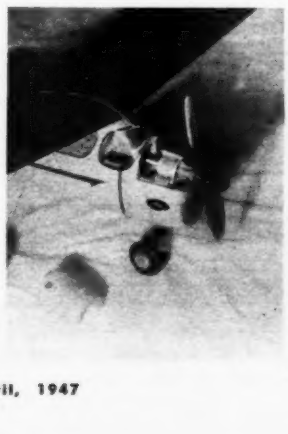
The wing itself is laid out in the conventional manner so no trouble should develop. Note that the trailing edge is notched to receive the rib, thereby preventing the edge from buckling later when covered. Select only the straightest wood for the wing, using the heavier grades in the inside panels as they are subject to greater strain. If available, use quarter grain stock for the ribs. The centersection ribs are 1/16 in. undersize on top and bottom to allow for the sheet balsa. Cut all the wing gussets from 1/16 in. or 3/32 in. plywood. When joining the wing sections, sufficient glue saves trouble later.

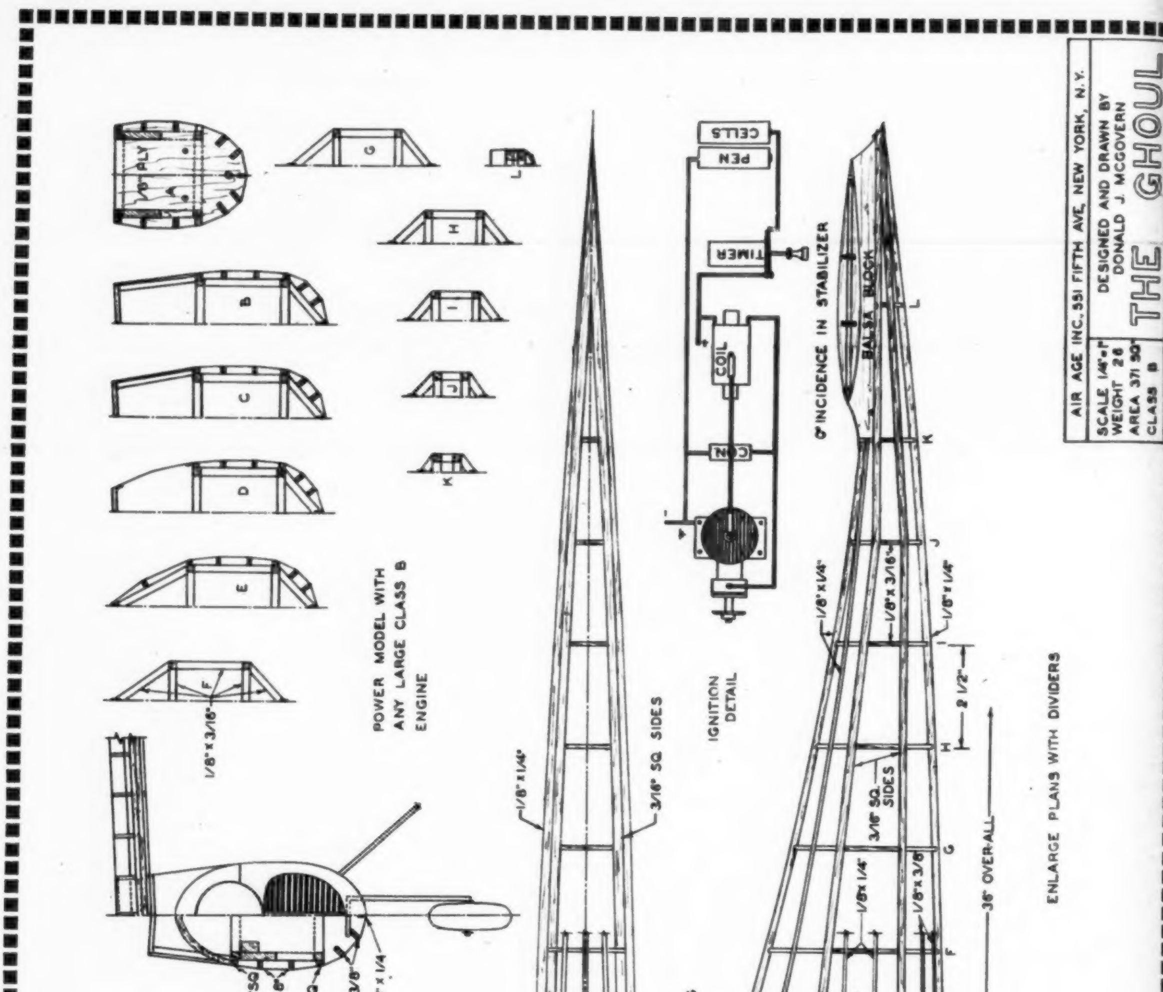
On the other hand the stabilizer is not constructed in the usual way. Due to the symmetrical airfoil, it would be hard to construct it as a wing. Instead, lay out the leading and trailing edges and the spars as 1/8 in. squares. 1/16 in. x 1/8 in. strips are then butted to the 1/8 in. sq. spars. In other words, the stabilizer is first constructed in a flat plane; later the spars are laminated with 1/8 in. square stock above and below, tapering toward the tips. Sheet wood caps are then glued over the 1/16 in. x 1/8 in. and then cut to the proper airfoil. An advantage of this type of construction lies in its resistance to warps due to the laminated construction.

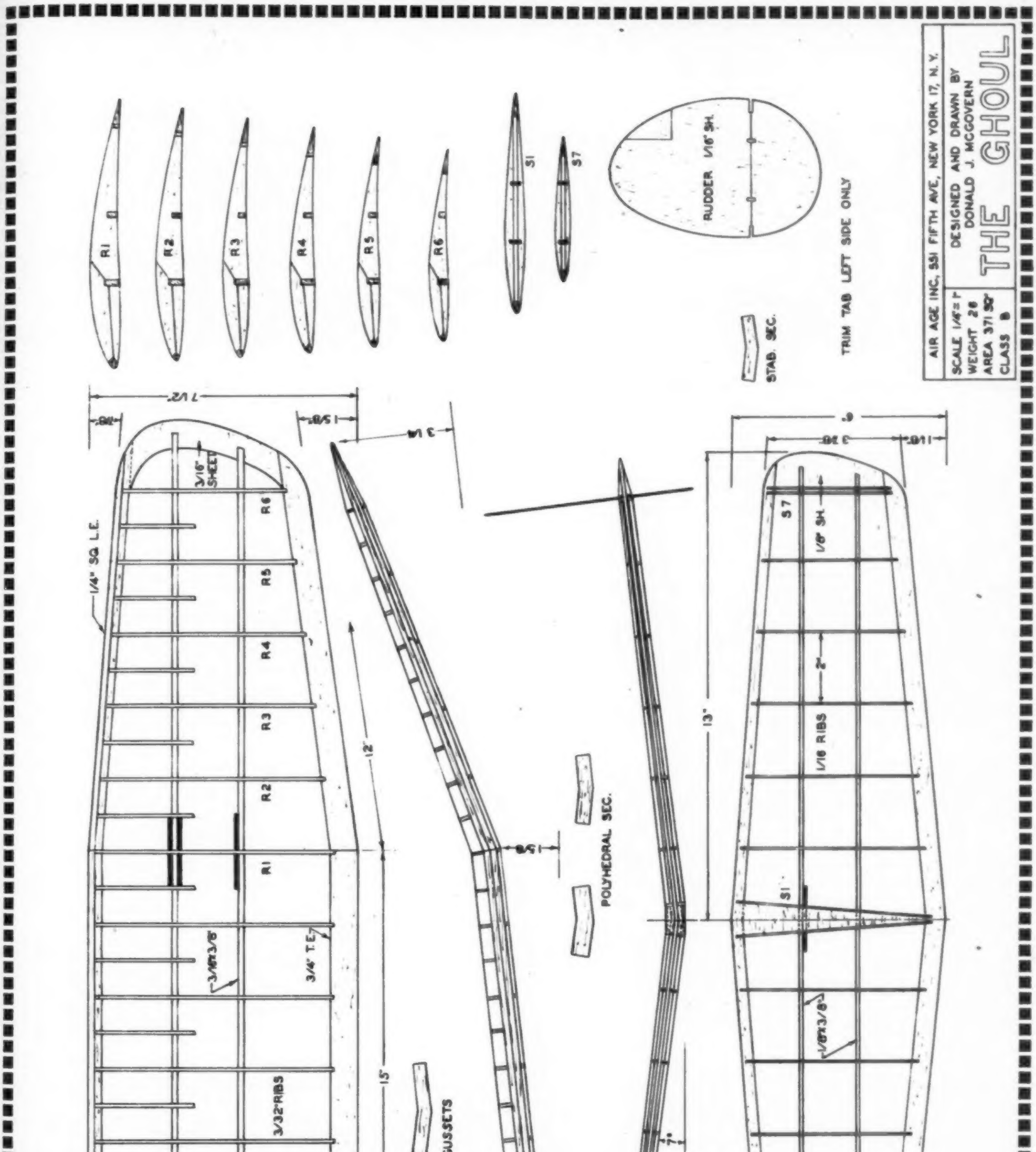
A 7 degree V is added before joining the two sections with a plywood gusset. Again the centersection is planked. The rudders are cut from medium grade 1/16 in. sheet balsa, split and notched as indicated. They are not glued in their respective slots until the stabilizer has been covered and doped. A small trim tab may now be added with the aid of an aluminum hinge.

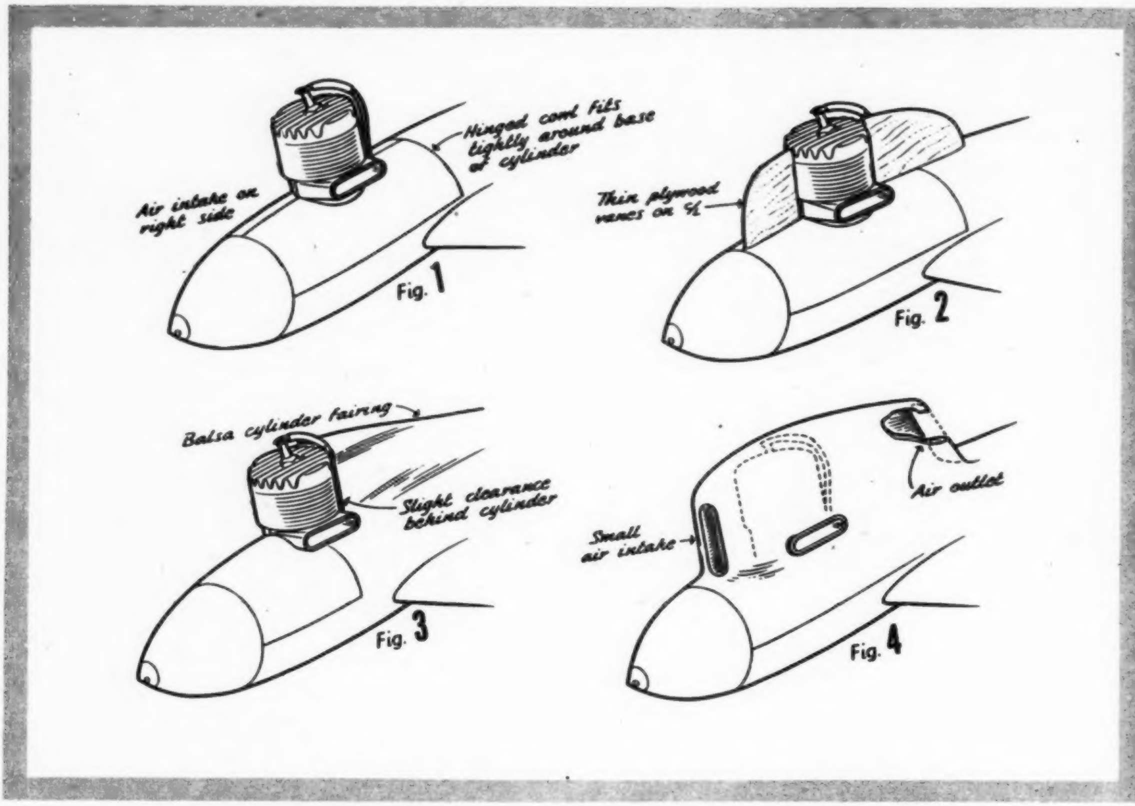
With the wing and tail assemblies out of the way we focus our attention on the fuselage. Actual construction begins with laying out the two sides of the body on the plan. Select longerons from medium grade balsa, testing each for warps and uniformity. At crossections E and J splicing is advisable, although not absolutely necessary. The motor mount bearers are

(*Turn to page* 45)




AIR AGE INC, 551 FIFTH AVE, NEW YORK, N.Y.
DESIGNED AND DRAWN BY DONALD J. MCGOVERN
SCALE 1/4"=1"
WEIGHT 26
AREA 371 SQ"
CLASS B
THE GHOUL
POWER MODEL WITH ANY LARGE CLASS B ENGINE
IGNITION DETAIL
CELLS
PEN
TIMER
COIL
CON
0° INCIDENCE IN STABILIZER
BALSA BLOCK
0° INCIDENCE IN WING
2° DOWN THRUST IN MOTOR
ENLARGE PLANS WITH DIVIDERS
36" OVER-ALL
2" WHEELS
3/16" SQ SIDES
1/8"x1/4"
1/8"x3/16"
1/8"x3/8"
3/16"x3/8"
3/16" SHEET BASS
1/8" SHEET
CABIN FAIRINGS
C.G.
C.L.A.
GRILL 1/20" BASS
VENTS
1/16" PLY
1/8" SQ
1/4"x1/8"
1/8"x1/4
4 PEN CELLS IN PARALLEL SERIES
SHOCK ABSORBER SPRING
2 WHEEL LANDING GEAR OPTION
3/32" WIRE
BOLT NOSE GEAR TO FIREWALL


AIR AGE INC, 551 FIFTH AVE, NEW YORK 17, N.Y.
SCALE 1/4"=1"
WEIGHT 2 8
AREA 371 SQ"
CLASS B
DESIGNED AND DRAWN BY
DONALD J. MCGOVERN
THE GHOUL
RUDDER 1/16" SH.
TRIM TAB LEFT SIDE ONLY
STAB. SEC.
R1
R2
R3
R4
R5
R6
S1
S7
1/4" SQ L.E.
3/16" SHEET
3/16X3/8
3/4" T.E.
3/32" RIBS
3/16X1/2
2"
12"
15"
7 1/2"
CENTER SECTION GUSSETS
3/32" PLY
POLYHEDRAL SEC.
13"
9"
1/16 RIBS
1/8" SH.
1/8X3/8
1/8X5/8



SPEED COWLS

The proper cowl may gain you that last extra mile of speed—study this discussion carefully

by H. A. THOMAS

MODEL design, like that of full scale aircraft, is a case of constant compromise. One factor usually has to be sacrificed to some degree in order to achieve a desirable effect in another. The question concerning engine cowls as opposed to uncowled engines is essentially this: Does a completely cowled engine, considering the fact that frontal area is increased and there is a turbulent flow of air inside the cowl, actually pay dividends in speed over an engine closely cowled at the base but with the cylinder head exposed?

Don Newberger's 134 mph speed made with a cowled model would lead us to believe that engine cowls are worthwhile, yet there are many other models which clip off high speeds with cylinders exposed. The best we can do on this subject is to outline four methods of handling the problem and let you decide for yourself which system seems most advantageous for your own use.

FIG. 1—First is the simplest of all: a neatly faired nose which allows only the exhaust port and the cooling fins to be exposed. Here the cylinder is just where the manufacturer meant it to be—in the air stream. We can be sure that there will be no problem of overheating, and we tolerate the turbulence behind the cylinder in order to get best cooling. The sparkplug is accessible here and the high tension lead fits closely behind the cylinder. A separate opening ought to be provided for carburetor air intake and to facilitate choking. The needle valve can extend through this same opening. The sketch suggests a divided cowl, hinged at the sides for access to the engine. Since the curve is essentially a simple one, the cowl might be a bent sheet of aluminum held in place by small screws.

FIG. 2—Next is a modification of the first and is of questionable value since it is based on theory alone. It has been used in the southwest, although we do not know whom to credit with its conception. Thin plywood fins or vanes, with sharpened edges, are mounted vertically in front of and behind the cylinder. The assumption is that these serve to reduce turbulence in the air flow by dividing it in front and at rear of the cylinder. It

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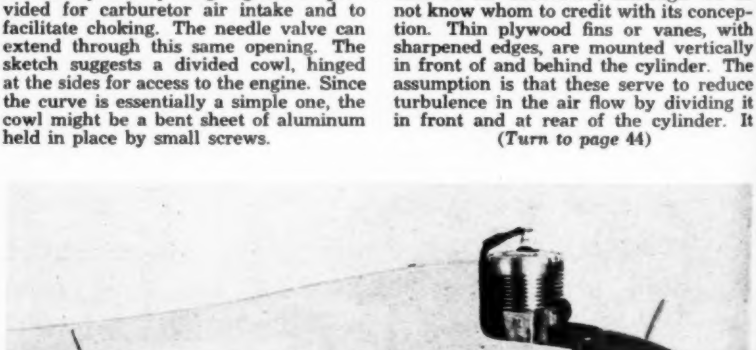
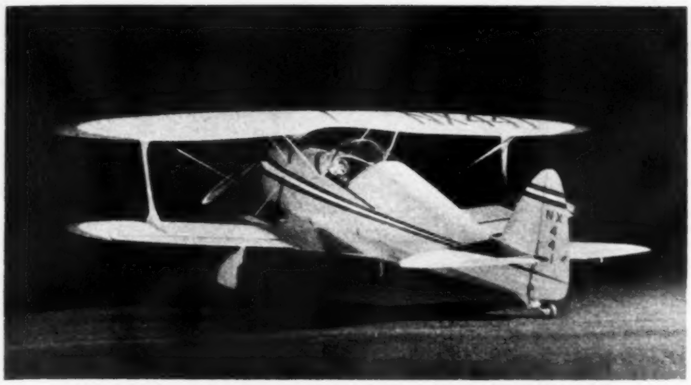
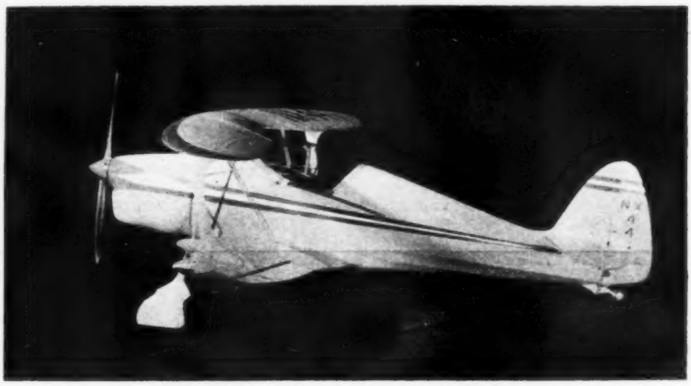




Metal fairing strips insure against distortion from tightened covering



Longitudinal striping emphasizes fuselage length

Silk covering with 15 coat finish calls for sturdy construction

The final lustre of the finish depends upon smoothness of surface

FINISH FIRST

In building your model do you consider its finish last? This author says it should be planned first

by FREDERICK K. HOWARD

ONE of the most critical phases of detailed scale model construction, particularly in the case of fabric covered models, is the finishing process. Exact detailed workmanship is often offset by an interior finish or by distortions of the structure from the finishing process. The importance of scale model finish has always been recognized but the relation of the structure to the finish, and the technique of scale model fabric work are subjects that heretofore have not been adequately treated.

The view that the finish of a detailed scale model is simply the last stage of construction and chiefly a matter of ingenuity takes more for granted than seems reasonable. Such a view suggests the use of the covering and finishing techniques followed in other types of model airplane construction, and while these techniques are satisfactory in some degree and do allow a finish of one kind or another, the results frequently leave much to be desired for the detailed scale model.

A fact of greatest importance is that scale models must be planned from the first with the definite idea of obtaining the type of finish precise craftsmanship deserves. This article is being written with the belief that more specific information on scale model fabric work will be helpful to many model builders.

Builders of detailed scale models will for some time be faced with the problem of reproducing in miniature doped fabric structures. For although uses of fabric in the aircraft industry are declining due to the development of other covering materials, doped fabric covering still has many advantages principally in the personal plane field.

Model builders are fortunate in having available covering materials which, when properly used, can duplicate in tautness, curvature and finish the fabric covering of full sized aircraft. Silk, for the scale model, remains tops for this purpose. Gas model type Silkspan paper is also highly satisfactory but does not possess the elasticity and durability of silk when finished.

Since model airplane silk has many of the characteristics of aircraft cotton fabric, it will benefit the scale modeler to understand something of the procedure followed in the fabric work of the aircraft industry. Many of the tricks and details of covering used in the aircraft industry can be adopted to advantage in the detailed scale model field. The aircraft industry in over 30 years' experience in fabric work has developed no significant shortcuts. It still remains a long process to turn a piece of cloth into a taut, mirror-smooth durable surface. Many model fans are unaware of the fact that the Howard aircraft, for example,

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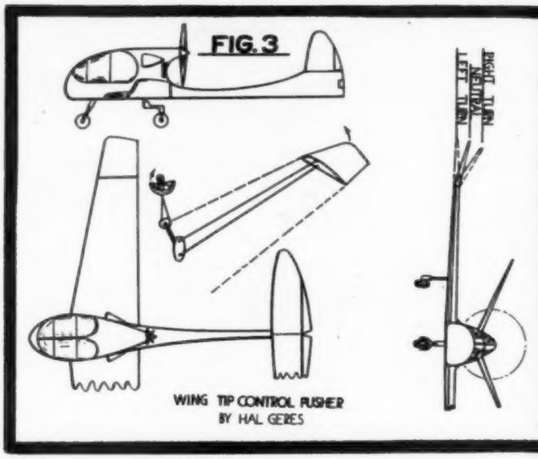
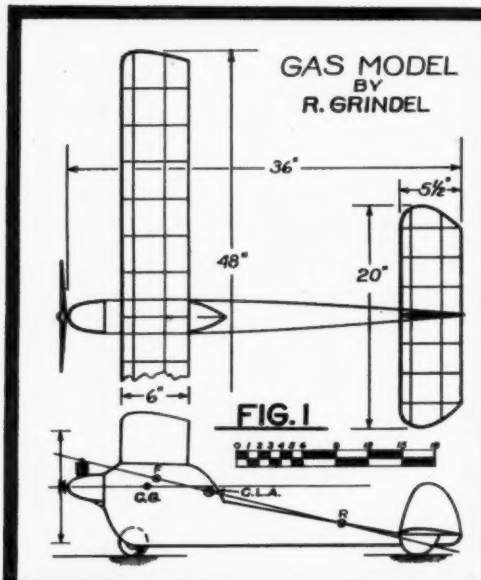
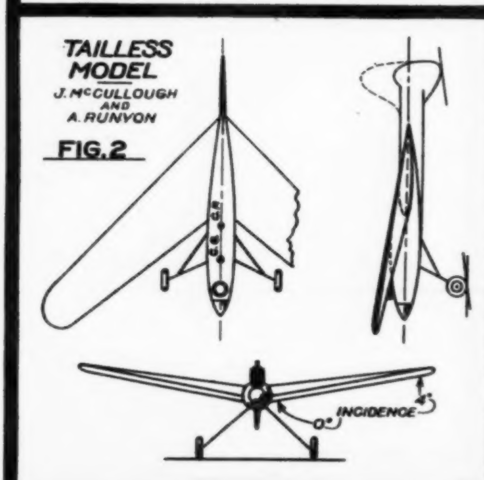
DESIGN FORUM

by CHARLES H. GRANT







WHILE man was learning to fly during the 1800's, there were two schools of thought concerning the approach to the flight problem. One (of which Samuel Pierpont Langley was a prominent advocate) was the conception that a full scale airplane should be built inherently stable like a free flight model; stability being built into the airplane so that in normal flight the plane itself would recover from displacements or resist them so they would have no effect upon the attitude and direction of flight. Control by the pilot constituted guiding the airplane to the right or left, up or down, through some suitable means. With this idea as a basis, Langley built a number of large power driven models which flew successfully for more than half a mile. Obviously, to fly without a pilot these models were inherently stable.

The next remaining step was merely to build the plane larger so it would carry a pilot to guide it. This he did, but unfortunately through no fault of the airplane's aerodynamic design it was wrecked on launching when one of the wires caught in the launching apparatus. Because of lack of funds Langley was never able to prove his contention that an inherently stable airplane could be built and flown merely by guiding it.

The second school of thought attempted to bypass inherent stability, and to maintain stability in flight and guide the airplane by means of controls operated by the pilot. Here the only problem was to build an airplane capable of rising into flight; after that the pilot would not only guide it but would make necessary corrections when it was displaced from normal flight. This second course seemed much easier, and many gliders were built in order to establish an airframe or structure capable of flight.

Montgomery and Lillienthal were the two chief glider experimenters before the Wrights. The Wrights powered their glider with a gasoline engine and attempted free flight. Unlike Langley's airplane, however, their machine was unstable and continuous correction through controls had to be made by the pilot to keep it right side up. In fact, anyone who has flown an old Wright Class B airplane *really learned to fly*—he did not merely ride in an airplane with the controls in his hands.

Flight, having developed through this second line of approach, naturally progressed along this line in the years that followed. Designers since then have thought chiefly of controlling an airplane rather than making it inherently stable and then guiding it. The demand for high speed, rather than safety through inherent stability, has also been largely responsible for this. Of course there have been many airplanes built which are extremely stable, but these were developed through modification of the second means and by improving the stability step by step of an original prototype design. In fact, many of the ways of producing stability in aircraft were first incorporated in free flight models and later adopted by full scale designers. This is true in almost every instance where stability of full scale airplanes has been improved.

Only under the necessity of designing stable airplanes for average civilian pilots have full scale airplane designers increased inherent stability of aircraft so that it is unnecessary in such cases for the pilot to stabilize the plane through controls as well as guide it. Since the Wrights, model builders

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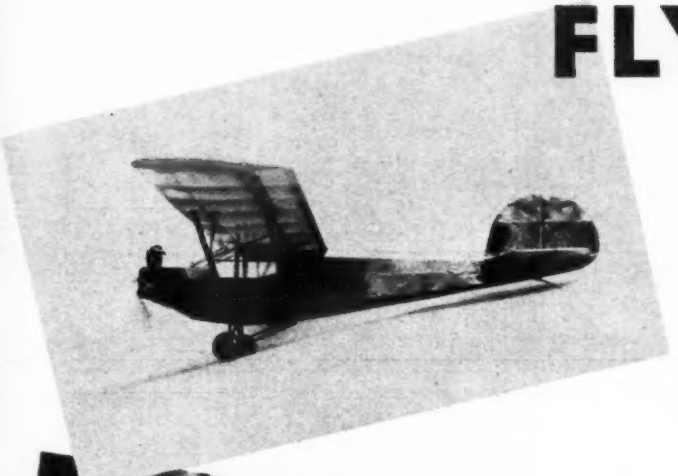
FLYABOUT

by ELBERT J. WEATHERS

Build this flying scale model which has the proportions to make it a real performer



HERE is a well designed pre-war American lightplane that lends itself admirably to model building. It was in the same category as the 40 hp Piper Cub, being of the same general dimensions and performance. The *Flyabout* had ample room for two people and a puppy—so stated Aircraft Mechanics, the manufacturer. Two powerplants were available: the Continental A40 of 38 hp, and the Szekely of 45 hp, as reproduced on this model. A few specifications covering the Szekely powered type are:

Wingspan	37 ft. 9 in.
Wing loading	5.51 lbs. per sq. ft.
Net Weight	590 lbs.
Climb rate	700 ft. per min.
Overall length	21 ft. 7 in.
Power loading	21.8 lbs. per sq. ft.
Service Ceiling	13,000 ft.
Cruising speed	75 mph
High Speed	93 mph

The scale of the model is 1/20 full size. All balsa used should be of firm texture unless otherwise specified.

FUSELAGE—Begin by making the two side frames (shaded on drawing). Use 1/16" sq. and 1/16" x 3/32" for these. 1/16" x 1/8" stock is required for front portion of the lower longerons. Assemble the two frames in the usual way, first installing the crossbraces under the wing position. Notice that a few of the upper crossbraces, of 1/8" sq. balsa (between nose and rear of cabin), are set low to allow passage of the rubber motor. When the fuselage frame is completed to this point, cut out the required formers from 1/32" sheet balsa. Cement each in their respective positions. The 1/32" x 1/16" stringers should now be put in the nose as well as the single stringer which runs along the center on the bottom.

Cover these areas with 1/64" sheet balsa, using three separate pieces in covering the bottom as shown. After cutting the rear rubber hook bulkhead to shape, bend the rear rubber motor hook from No. 15 piano wire and insert in the bulkhead, following with the placing of the unit in the fuselage frame at rear as shown.

The nose block, of medium-hard balsa, is made next. It is simply cut to shape, plan and side views, and the resulting corners rounded off. Before cementing it against the fuselage frame, drill a hole for the propeller shaft to accommodate No. 15 piano wire. The front bearing is a dural aircraft type rivet, drilled for the same wire (running fit), and sunk in the nose block with cement in a counter-drilled hole.

The dummy Szekely engine can now be made and cemented in place. Each of the three cylinder units are identical, being built up with small bits of balsa. Wrap each with wire or thread to represent the cooling fins. The exhaust stacks and tappet gear are merely lengths of balsa dowel assembled with cement. The two valve springs on each

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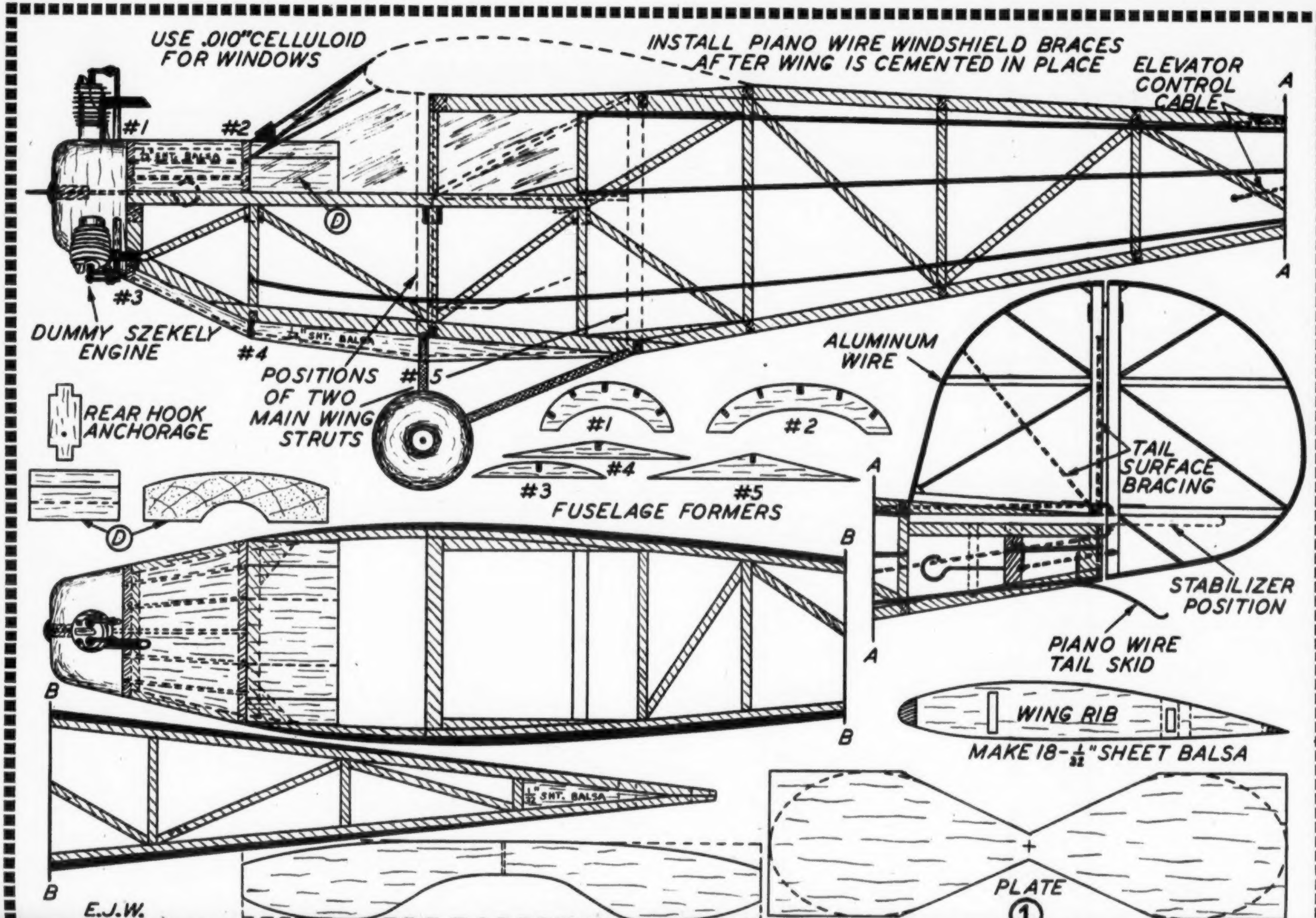
USE .010" CELLULOID FOR WINDOWS
INSTALL PIANO WIRE WINDSHIELD BRACES AFTER WING IS CEMENTED IN PLACE
ELEVATOR CONTROL CABLE
A
A
#1
#2
D
#3
DUMMY SZEKELY ENGINE
#4
POSITIONS OF TWO MAIN WING STRUTS
#5
REAR HOOK ANCHORAGE
D
#1
#2
#4
#3
#5
FUSELAGE FORMERS
ALUMINUM WIRE
TAIL SURFACE BRACING
STABILIZER POSITION
PIANO WIRE TAIL SKID
A
A
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WING RIB
MAKE 18-1/32" SHEET BALSA
1/32" SHT. BALSA
PLATE
1
E.J.W.

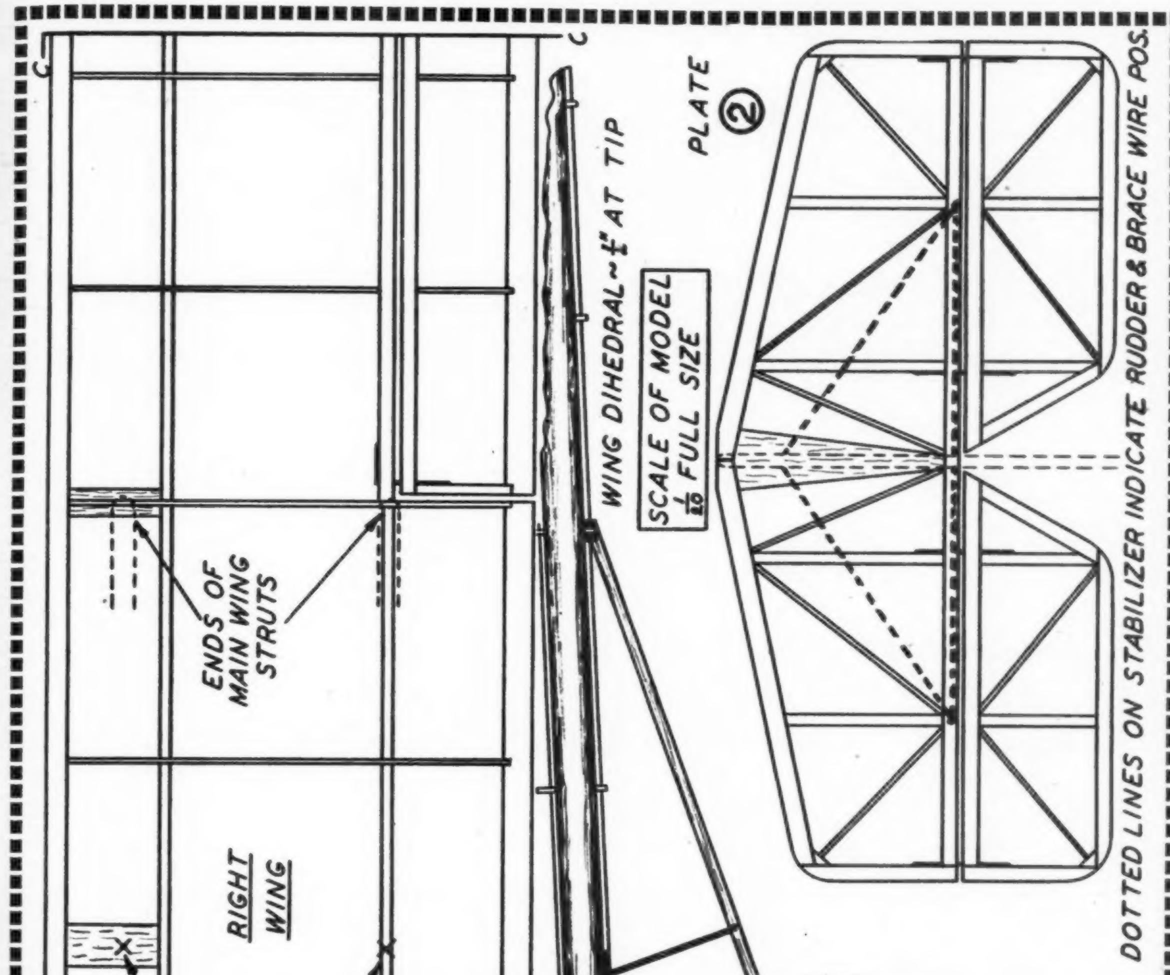
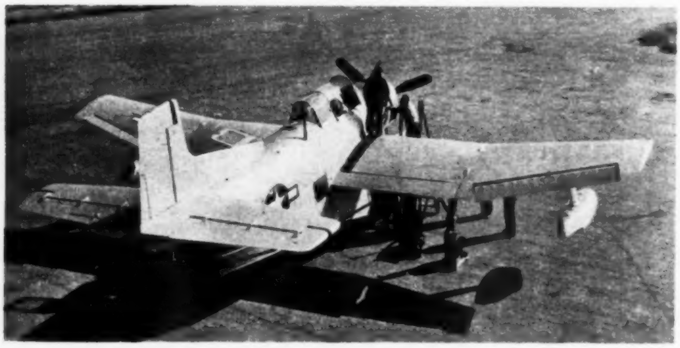


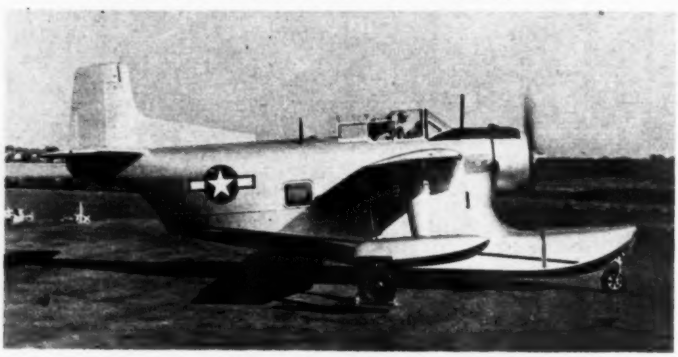
PLATE 2
SCALE OF MODEL 1/16 FULL SIZE
WING DIHEDRAL ~ ½" AT TIP
DOTTED LINES ON STABILIZER INDICATE RUDDER & BRACE WIRE POS.
ENDS OF MAIN WING STRUTS
RIGHT WING
BRACES BETWEEN MAIN STRUTS AND WING HERE
1/32" SHT. BALSA
FUSELAGE LINE
DIHEDRAL BEGINS HERE
C
C
C
C

PLANE ON THE COVER

The XJL-1 shortly after takeoff with the wheels partially folded



The figures give a good idea of the size of this new Navy amphibian



Extraordinary depth of fuselage shows clearly in this side view

A closeup which will give the detail hounds plenty to work with

COMBAT aircraft may win wars, but a powerful lot of the winning is often done by the lowly "yard craft" of our aerial fleets. The trainers, transports and "train" craft are as essential to aerial warfare as the fighter and bomber, and on hundreds of occasions the arrival of a strategic repair part in the nick of time moved the victory closer. "For want of a nail" was a time-tested philosophy in cavalry days, but "for want of a bolt" proved just as true in World War II in which aerial battles were often won or lost on an airstrip in the Pacific or a desert base long before the squadron ever took off. That was the wartime role of the much maligned "utility" aircraft of Naval Aviation in World War II, and many's the fighter pilot who will say "Bless 'em" as he recalls the arrival of a "windjammer" in the nick of time.

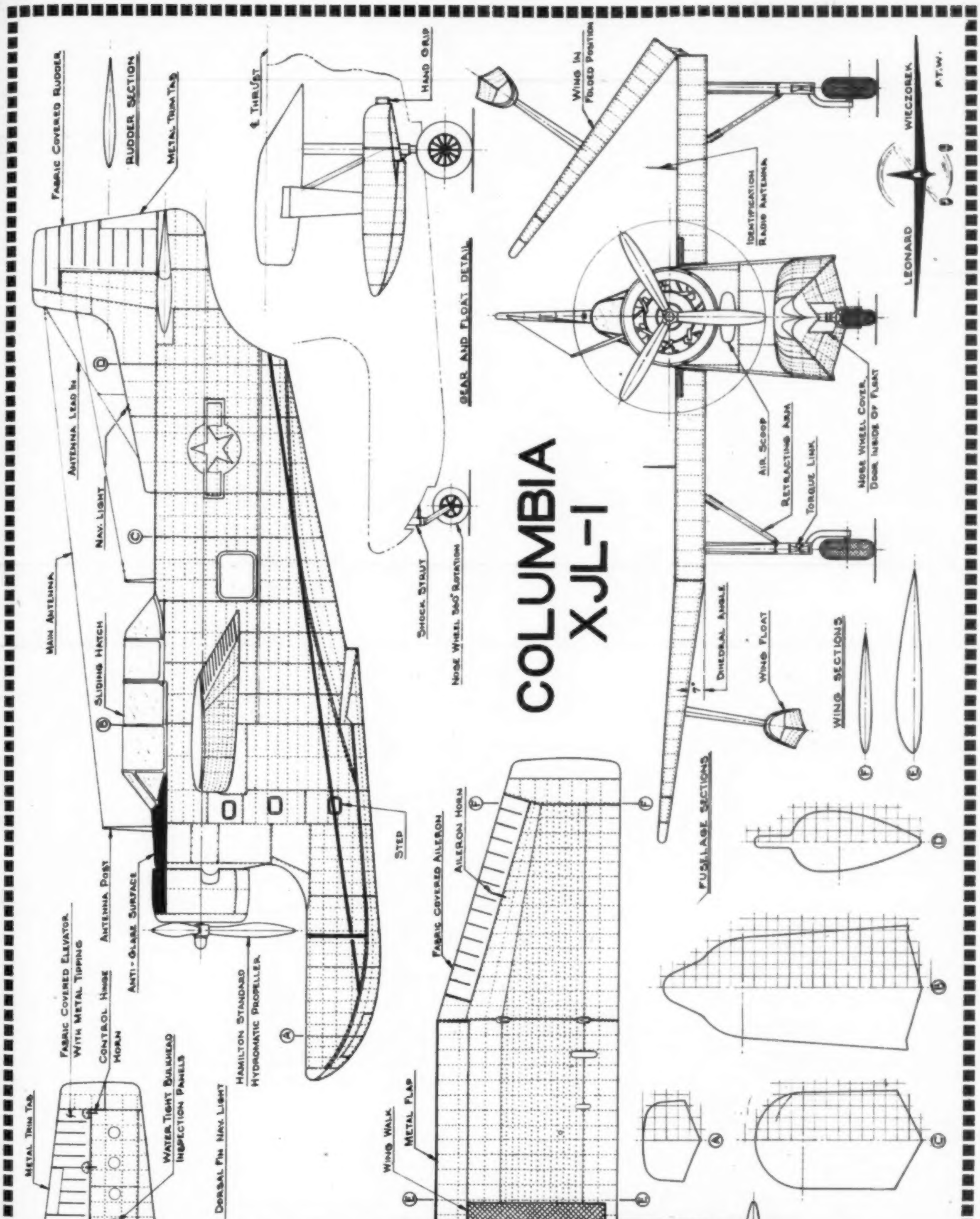
In peacetime the "J for Utility" often was painted on the rudder of any aircraft, regardless of type, that had grown old in the service and had been placed out to pasture, to serve out its enlistment as an errand boy. Once sleek multi-engine patrol planes of the mid-thirties became "utilities" during the late thirties when the newer patrol-bombers came into service. Utility squadrons from coast to coast flew everything from Grumman fighters to Ford tri-motors in those days.

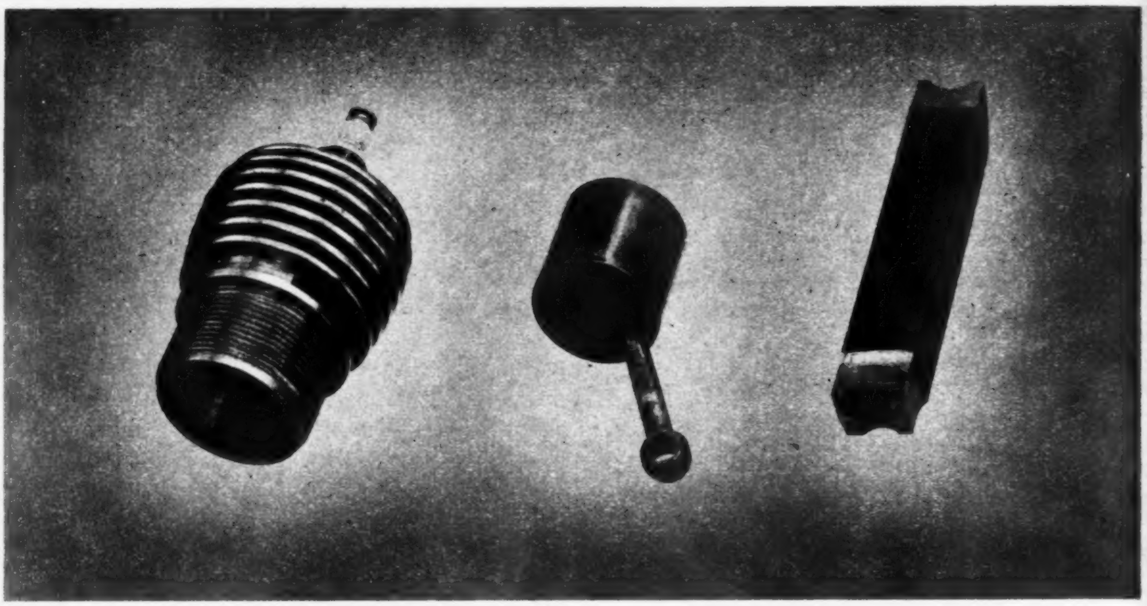
But the war changed all that and the word "utility" quickly became a carefully defined and exclusive term. For with Pearl Harbor came a new and vital function for the utility plane. Designed-for-the-purpose utility planes came into being and existing types went into quantity production. One of the best of these was the Grumman J2F *Duck*, a biplane amphibian which has always constituted one of the most challenging design problems in the aircraft industry book. Grover Loening pointed the way in the early twenties when he fashioned his famous "flying shoehorn," which solved the basic problem of the single engine amphibian: "Where will we put the engine?" And when in 1929 one of his most talented engineers, Leroy Grumman, resigned to start his own firm, the "flying shoehorn" idea migrated from Loening but with his blessing and (many say) financial support.

The Grumman XJF-1, a cleaned up Loening OL, stretched its wings for the first time in 1931 and announced the rebirth of the idea. The Navy took to the idea to the tune of over 300 of them in the following decade, with continuing improvements.

And Pearl Harbor made little difference to the "Duck"; the Navy wanted more of them! There were few engineers more surprised and chagrined by this order than Leroy Grumman, who was already at work on a single seat fighter eventually to become famous as the *Hellcat!* The *Wildcats* were flowing down Grumman production lines, the new *Hellcat* was being made ready for quantity production, and "Jake" Swirbul was begging and borrowing used steel to expand the Grumman plant—still the Navy wanted more

(*Turn to page 77*)


COLUMBIA
XJL-1
Fabric Covered Rudder
Rudder Section
Metal Trim Tab
℄ Thrust
Hand Grip
Wing in Folded Position
Identification Radio Antenna
Gear and Float Detail
Antenna Lead In
Nav. Light
Main Antenna
Sliding Hatch
Step
Antenna Post
Anti-Glare Surface
Fabric Covered Elevator With Metal Tipping
Control Hinge Horn
Hamilton Standard Hydromatic Propeller
Water Tight Bulkhead Inspection Panels
Dorsal Fin Nav. Light
Metal Trim Tab
Wing Walk
Metal Flap
Fabric Covered Aileron
Aileron Horn
Fuselage Sections
Wing Sections
Wing Float
Dihedral Angle
Shock Strut
Nose Wheel 360° Rotation
Air Scoop
Retracting Arm
Torque Link
Nose Wheel Cover, Door Inside Of Float
Leonard Wieczorek
P.T.W.



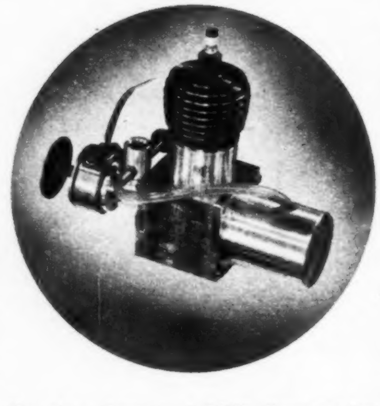
At left is completed cylinder; center, assembled piston and connecting rod; at right, a special tool used to form balls on the connecting rod

SIMPLEX 25

PART TWO

by LOUIS GARAMI

Concluding instructions for building this fine little motor



HAVING covered construction of most of the basic parts of our two cycle motor, we have left only the cylinder, piston and connecting rod to be made plus a few finishing touches on other parts that were previously set aside. Let us start this month, therefore, with the most complicated part—the cylinder.

CYLINDER—This part is made of Meehanite, which is a cross between cast iron and steel; this material has a great advantage over steel when used for cylinders or pistons. Ninety percent of the pistons used in production engines are of Meehanite. If either piston or cylinder is made of this metal the fit between the two can be very close, in fact actually tight, without danger of scoring the surface or "picking up." This is a feature of all forms of cast iron which is porous and therefore can be compressed slightly. However, cast iron is not very strong when machined down to a thin section, as it should be in the case of model gas engines, and air bubbles sometimes make it full of small holes. Meehanite is much stronger and more uniform while retaining the good properties of cast iron; also it can be heat-treated to the hardness of steel if desired.

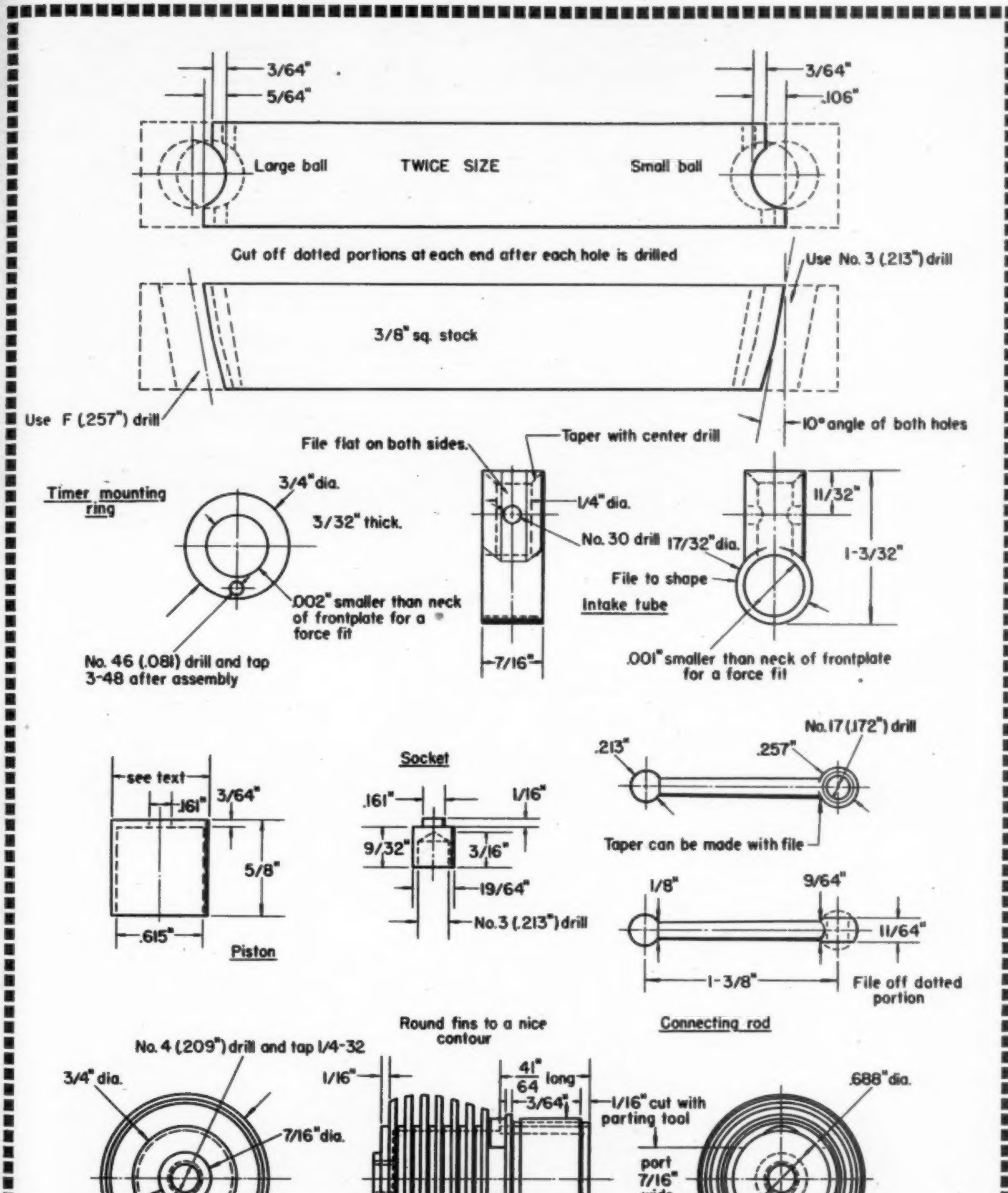
Mount the 1¼" diameter Meehanite so that you have about 2" sticking out of the chuck; more overhang than this is undesirable because for fin cutting the stock must be as rigid as possible. Turn the piece down to 1-3/16" diameter for the full length; then turn the first half inch down to the size of the full thread, or 55/64". Now cut the thread on this portion very slowly, taking light cuts especially toward the finish because one-thousandth of an inch looseness in the thread feels as if it were 1/32". At the shoulder, cut in with the parting tool just deep enough to clear the thread and about 1/16" wide. The same thing can be done at the start of the thread—this will allow the cylinder to screw snugly into the crankcase.

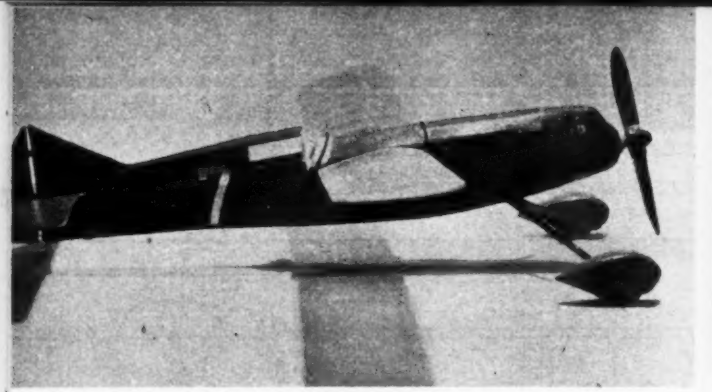
To make the fins, a 1/16" wide parting tool is used which should be able to go in about ⅜" deep. If it is possible to move the compound rest freely with the tail stock so close, the Meehanite should be center drilled so that the tailstock center can be brought into use for extra support. On most lathes this is possible. The single fin below the exhaust port should be 3/64" thick; the space next to it for the port is ⅛" wide and the diameter at this point is 55/64" (same as the full thread). Naturally you will have to make two cuts with the parting tool to get the ⅛" width. Next come seven fins each 3/64" thick, making a fin and a space about 7/64" altogether. The depth should be such that the diameter at the base of each fin is ¾" at each of the six spaces. The two small steps at top of the head should not be cut at this time as we must keep the piece strong until the hole is bored out and finished.

Drill a hole about 2" deep into the piece with a No. 4 drill (.209) which is the tap drill for the ¼-32 thread of the sparkplug. Now use progressively larger drills up to ⅝" to remove most of the metal before the boring tool is employed. Depth of the cylinder bore is 1-21/64". This and other measurements of the cylinder should be kept quite close because the compression ratio and the location of the bypass and exhaust depends on them; inaccuracy may lead to trouble later. A few thousandths here and there will not matter, but more than that may add up into a sizeable discrepancy. The hole should be finish-bored to .687" with a boring tool whose cutting edge is almost parallel to the surface so that it will take a shaving cut.

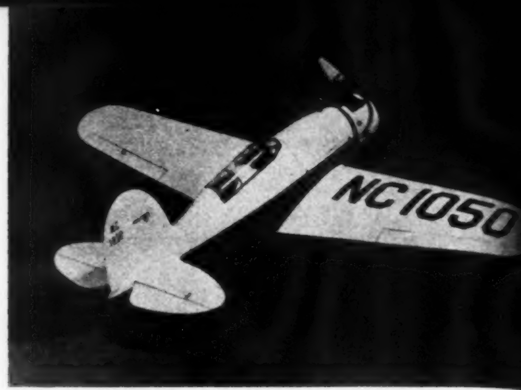
If you have a tool-post grinder, set it in place and take a cut of about a half thousandth through the bore with a ⅝" or ½" diameter wheel and run it back and forth 4 or 5 times without changing the adjustment. This will suffice to glaze up the cylinder surface and give it fine wearing quality. If you have no tool-post grinder, make a short cast iron or brass lap and work over the surface using the finest lapping compound you can obtain. Do not overdo this as the cylinder metal gets charged up with compound so that it will emit this material from its pores long after it has been thought to be clean. In any case when the surface looks smooth, wipe the barrel and the lap clean

(*Turn to page 80*)

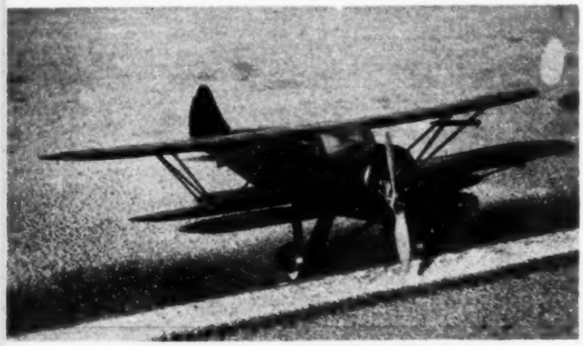

3/64"
5/64"
3/64"
.106"
Large ball
TWICE SIZE
Small ball
Cut off dotted portions at each end after each hole is drilled
Use No. 3 (.213") drill
3/8" sq. stock
Use F (.257") drill
10° angle of both holes
File flat on both sides.
Taper with center drill
Timer mounting ring
3/4" dia.
3/32" thick.
1/4" dia.
No. 30 drill
11/32"
17/32" dia.
1-3/32"
File to shape
Intake tube
.002" smaller than neck of frontplate for a force fit
No. 46 (.081) drill and tap 3-48 after assembly
7/16"
.001" smaller than neck of frontplate for a force fit
see text
.161"
3/64"
5/8"
.615"
Piston
Socket
.161"
1/16"
9/32"
3/16"
19/64"
No. 3 (.213") drill
.213"
.257"
No. 17 (.172") drill
Taper can be made with file
1/8"
9/64"
11/64"
1-3/8"
File off dotted portion
Connecting rod
Round fins to a nice contour
No. 4 (.209") drill and tap 1/4-32
3/4" dia.
1/16"
41/64 long
3/64"
1/16" cut with parting tool
.688" dia.
7/16" dia.
port 7/16" wide
1-3/16" dia.
3/64"
1/8"
1/16"
3/32"
1-21/64"
Turn to 55/64" dia. and cut 28 thread
1/32" deep cut with 3/8" dia. end mill
All fins 3/64" thick
1/16" between all fins
Cylinder
CONSTRUCT FROM DIMENSIONS ONLY, DO NOT SCALE FROM PLAN
JAY THOMAS HOLMES



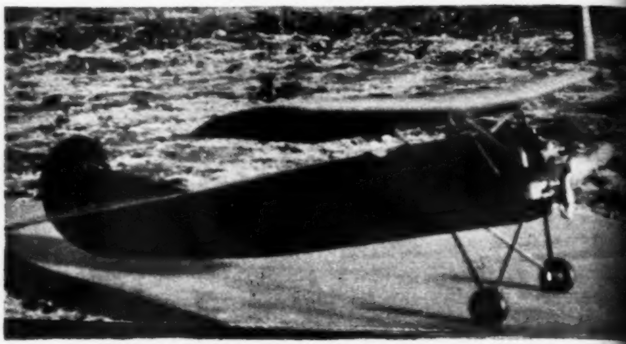
No. 1 This rubber speed ship by Alan S. Reed is realistic as well as fast



No. 2 Note finish on this *Sirius* by J. C. "Madman" Yates



No. 3 Victor G. Mathern built this Waco U-Control ship



No. 4 Fokker D8 from Sweden by Rigo Lindgren has diesel motor

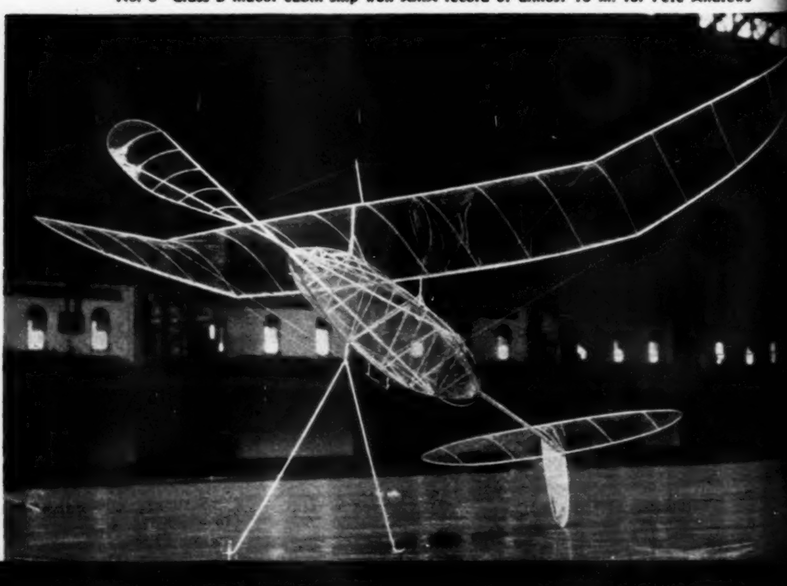
AIRWAYS

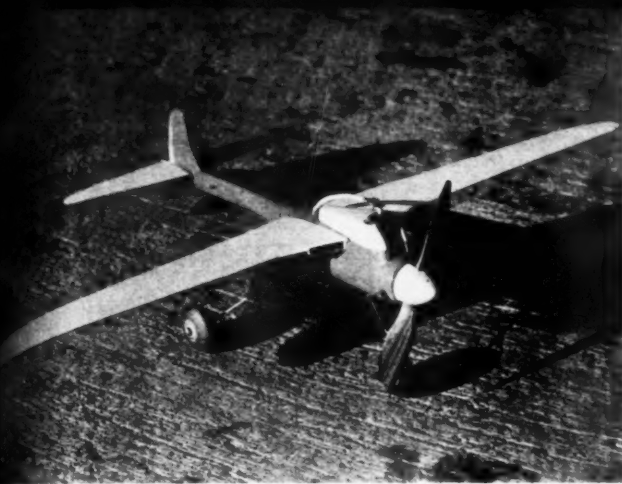
News of model airplane experimenters from all over the world

No. 5 *Super Buccaneer* sent from England by R. F. Fowler has been rebuilt for the coming season

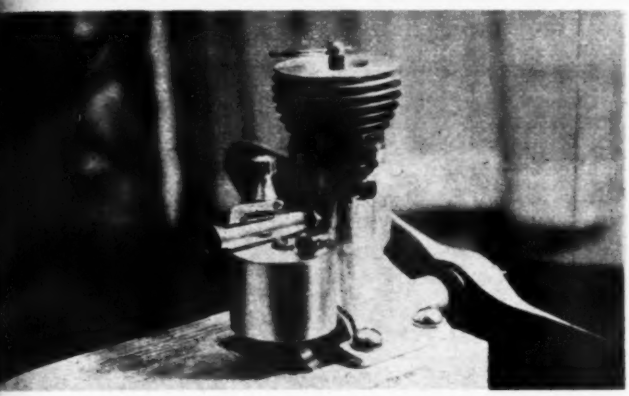
No. 6 Free flight gassie SE5 by John E. Cleland
No. 7 Franco B. Cipres built this bipe in Mexico

No. 8 Class B indoor cabin ship won AMA record of almost 18 m. for Pete Andrews

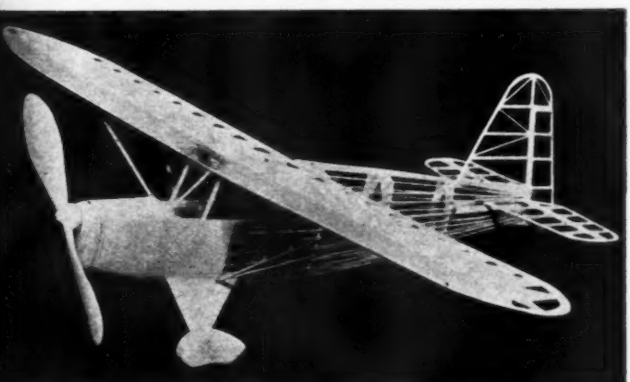




No. 9 All-time favorite ship of Ray Daniel is this Class A control liner



No. 10 Highly successful .199 diesel was designed and build by John Mosca



No. 11 D. F. Galasneau sent shot of Rearwin Speedster before covering
No. 12 Two Ohlsson 23's power this beautiful B25 by Warren R. Watson

AIRWAYS PICTURES. A letter from David Blodgett of Carthage, N. Y., tells of his great interest in "Airways" and suggests that more material for this feature might be sent in if a small prize were offered for pictures that are printed. To reassure Dave, and those other readers who have not heard of our offer, may we say that each correspondent who sends in a picture used on this page will receive a free year's subscription to MODEL AIRPLANE NEWS (present subscribers will receive an additional 12 issues).

This policy has been in effect for some time and has resulted in our receiving far more photos than we can use. Unfortunately, many of the pictures sent are totally unfit for reproduction—so we request readers to study carefully the remarks on preparation of these shots on pg. 29 of the August 1946 issue.

While the free subscription is a good break for readers in this country, it is much more so for those who reside in other parts of the world. Many of our foreign readers tell us that even though they have the money, it cannot be sent to us because of currency restrictions. We hope such readers will take the hint and send in plenty of good shots of their latest work.

THE BREWER AWARD. As many readers have undoubtedly heard, the Frank G. Brewer Trophy—awarded annually to the individual who has contributed the most during the year in the furtherance of air age education for young people—was given last December to Frank E. Sorenson, a member of the teaching staff at the University of Nebraska. In a recent communication, Mr. Sorenson stresses that air age education in this country has progressed rapidly since 1941—when it was, except in isolated instances, very sketchy—to the present when it has "—definite implications for every teacher and every pupil."

He also points out that the nation must overcome the problem arising from the fact that young people must be educated in the implications of the air age by teachers who have never experienced air travel. He concludes with the thought that education in the field must accompany the technical advancements now coming so rapidly.

EAST-WEST CHALLENGE. While no new plans have been formulated for this great control line battle, a development has entered the picture that probably needs a little comment.

We received a letter from Edward L. Brown of the *Torque Jockeys*, Urbana, Ill. who feels rather badly that the Middle West was not included in the challenge issued by the Eastern flyers. He takes this as a personal slight to the modelers in his area.

Let us hasten to assure Mr. Brown, and spokesmen for other groups or areas, that such a thought never entered the minds of Tom Herbert and his Eastern cohorts when the challenge was issued.

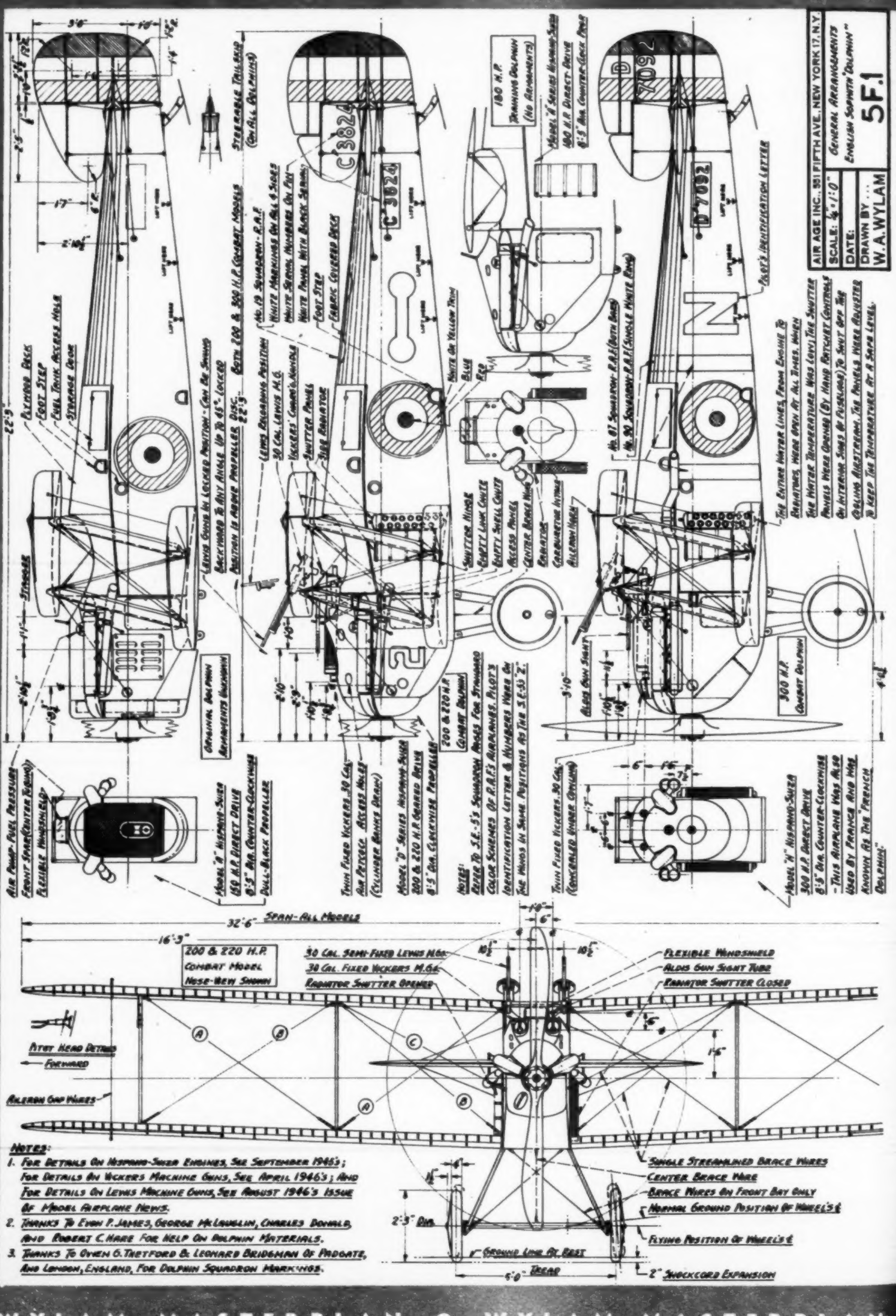
The background for this challenge has been building up for a year or more and has been based on styles of flying, types of pylons used, the art of "whipping," and other problems of control line flying. Actually, though termed an East-West match, the scheduled contest is between rather small areas. In the East, most of the interested parties are located within less than 100 miles of New York City; in the West the hot flyers involved are concentrated in the lower half of California. Thus it would probably have been wiser to define the groups more accurately.

Events were building up to a good climax last summer —what with claims, counterclaims, strongly expressed doubts and so on, until with the Nationals approaching everyone expected a fine clash between the two groups on the neutral ground of Kansas. However, the big battle did not ensue because the Easterners were not fortunate enough to have a local "Ohlsson and Rice Express." For this and other reasons they couldn't get to Wichita. Their non-appearance was at once construed by some zealous but unthinking Western supporters as due to a wide yellow streak. It was to prove this untrue that the challenge was issued.

So we ask all flyers in other areas not to feel they have been slighted, but to watch the coming event as interested spectators from the sidelines. After all, the East-West Challenge fly-off will be followed by the Nationals; it is quite possible that the winner at the Nationals may be a Midwesterner, a Southerner, or perhaps a Canadian. So let our East-West groups have their fun, then the other groups can go gunning for the winner at the Nats!

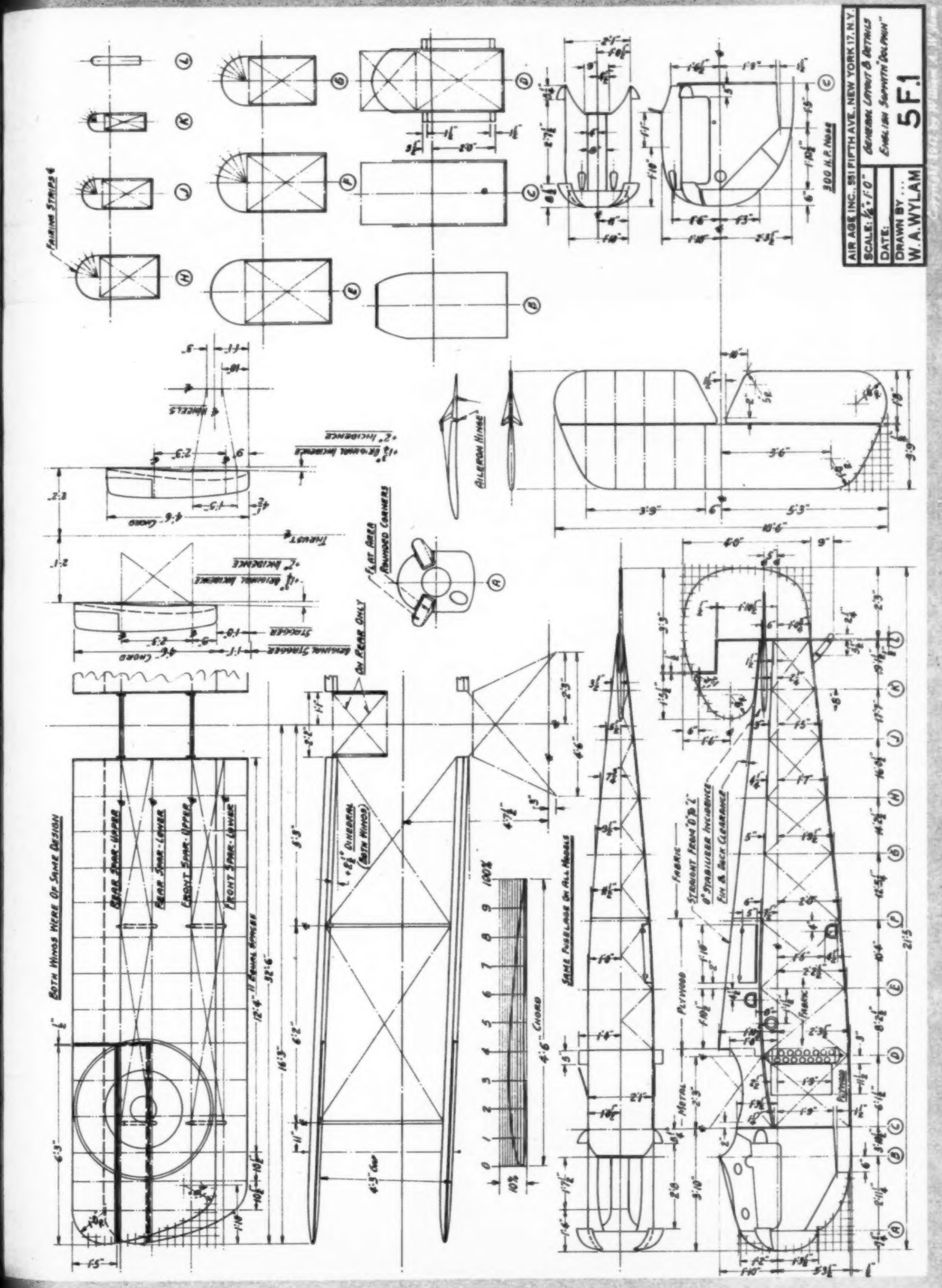
1947 NATIONALS. While the time and place of the Nationals for this year have not been definitely announced at the time this is written, it is now official that the Nats as well as the preliminary meets to be held locally will be

(*Turn to page 60*)


AIR AGE INC., 351 FIFTH AVE., NEW YORK 17, N.Y.
SCALE: 1/4" = 1'0"
GENERAL ARRANGEMENTS
ENGLISH SOPWITH "DOLPHIN"
DATE:
DRAWN BY W.A.WYLAM
5F.1
32'6" SPAN - ALL MODELS
16'3"
200 & 220 H.P. COMBAT MODEL NOSE-VIEW SHOWN
.30 CAL. SEMI-FIXED LEWIS M.G.s
.30 CAL. FIXED VICKERS M.G.s
RADIATOR SHUTTER OPENED
FLEXIBLE WINDSHIELD
ALDIS GUN SIGHT TUBE
RADIATOR SHUTTER CLOSED
PITOT HEAD DETAIL
FORWARD
AILERON GAP WIRES
SINGLE STREAMLINED BRACE WIRES
CENTER BRACE WIRE
BRACE WIRES ON FRONT BAY ONLY
NORMAL GROUND POSITION OF WHEEL'S ℄
FLYING POSITION OF WHEEL'S ℄
2" SHOCKCORD EXPANSION
2'3" DIA.
GROUND LINE AT REST
5'0" TREAD
NOTES:
1. FOR DETAILS ON HISPANO-SUIZA ENGINES, SEE SEPTEMBER 1945'S; FOR DETAILS ON VICKERS MACHINE GUNS, SEE APRIL 1946'S; AND FOR DETAILS ON LEWIS MACHINE GUNS, SEE AUGUST 1946'S ISSUE OF MODEL AIRPLANE NEWS.
2. THANKS TO EVAN P. JAMES, GEORGE McLAUGHLIN, CHARLES DONALD, AND ROBERT C. HARE FOR HELP ON DOLPHIN MATERIALS.
3. THANKS TO OWEN G. THETFORD & LEONARD BRIDGMAN OF PADGATE, AND LONDON, ENGLAND, FOR DOLPHIN SQUADRON MARKINGS.

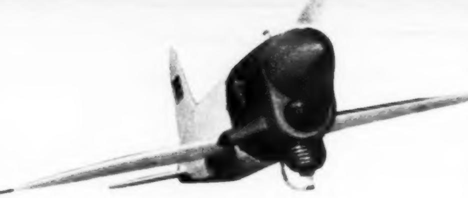
will appear in the May issue

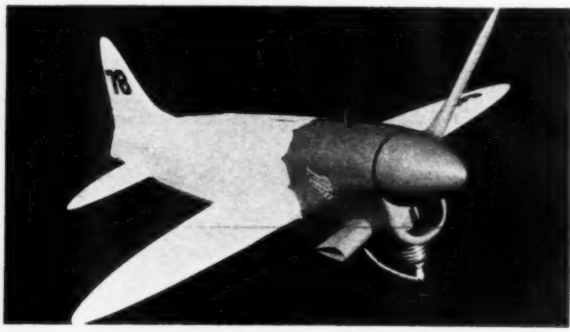
● WYLAM MASTERPLAN ●

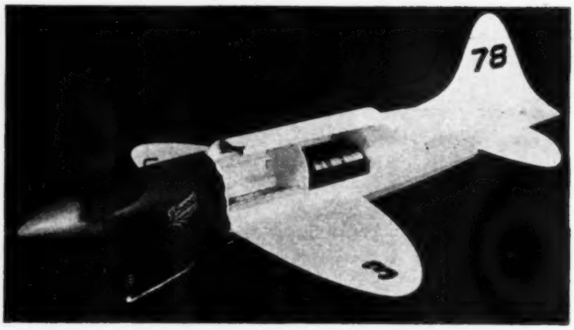


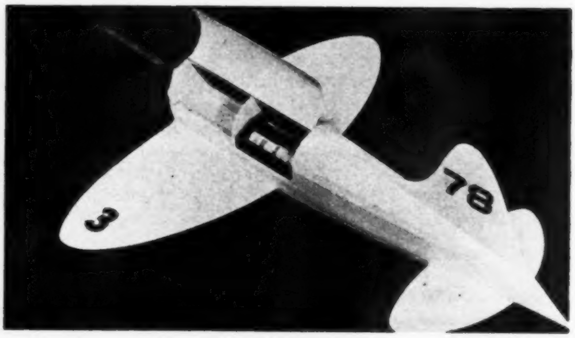
● WYLAM MASTERPLAN ● WYLAM MASTERPLAN ●

POLE CAT









by FRANK EHLING

THE *Pole Cat* was a product of our experience gained in U Control, but it was not flown the normal way. It had all its time on the end of a line anchored to a 40 foot pole set in the ground. In this way the ship was flown round and round without any danger of a crackup; and here we learned that a one blade high pitch prop was the real thing.

The partly cowled engine was the best bet because it enabled us to cool the engine and streamline the accessories. Thin wing and tail surfaces were used because they gave least drag. The entire ship was polished to reduce drag as much as possible. The large aluminum cowl to gain access to the ignition is very welcome as it provides accessibility to the batteries with little trouble.

The first model of this ship was never flown. However, the second one was built to the same plan and it had a chance at this new method of flying. Everyone who saw her perform was on the waiting list for the original plan.

To start this *Cat*, enlarge the plan to full size using a pair of dividers; this should be done with care because the whole ship's performance depends on it. After the plan is drawn to required size, lay out the crutch atop the plan and cement the engine bearers in place. Now cement formers in; start at the rear and work forward. Make sure to get them all in their correct places and to cement them well.

The tail block is now fastened in place. Add the cowl blocks to the fuselage; however, cement them in place lightly as they are to be removed and hollowed out after they are shaped. The job can be simplified by making the spinner and cementing in place. Now, using the firewall (former A) as a guide and carving from it to the spinner, form the cowl to correct shape. The large exhaust stack helps the engine expel burned gases, a gain in engine performance over the drag set up by it; the stack can be made of sheet brass or tin from a can.

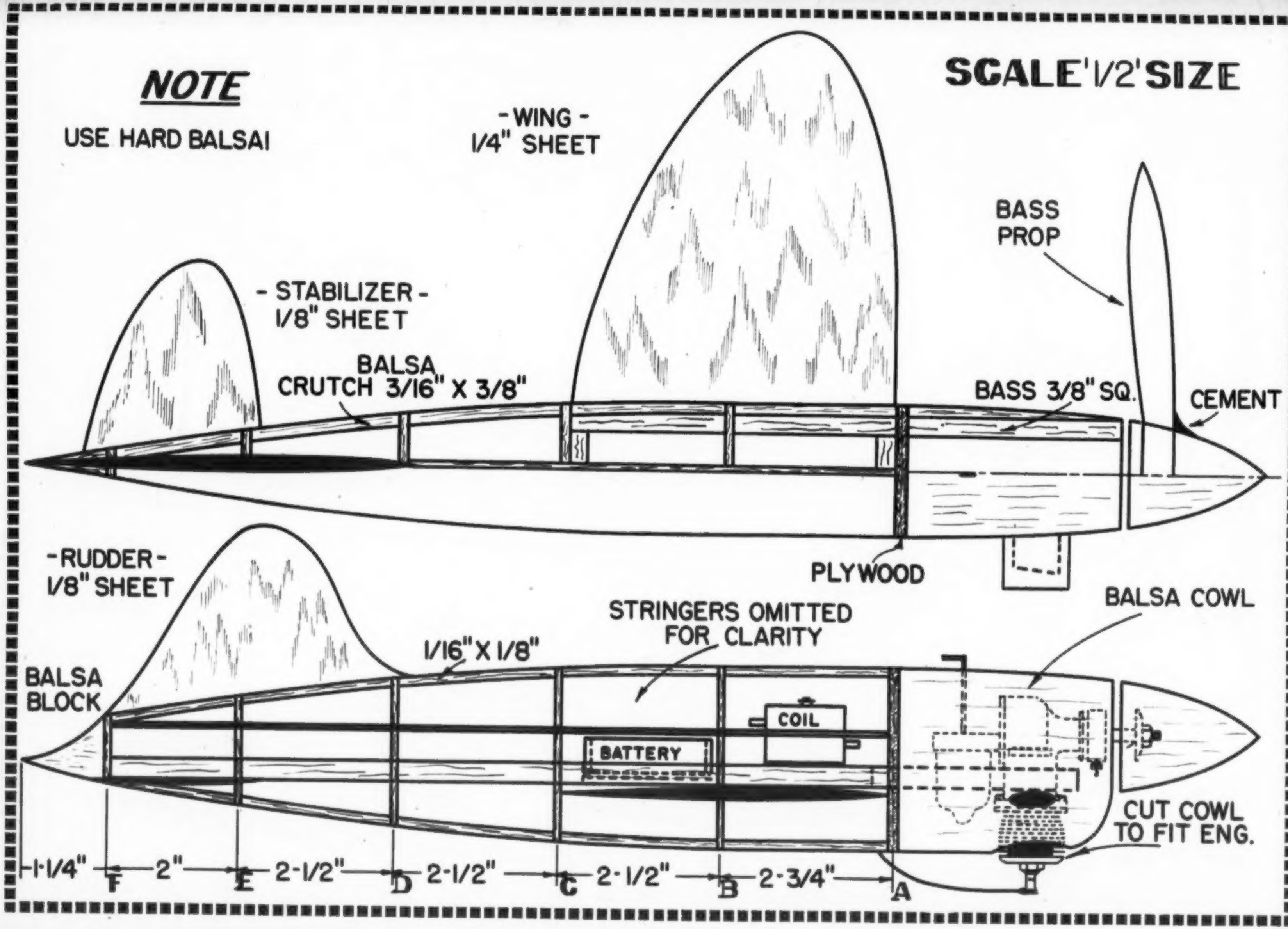
The tail surfaces should be of hard balsa; they can thus be made thin and yet will not warp when doped. After they are cut out and sanded to shape, cement in place. Set both at 0° to the thrust line.

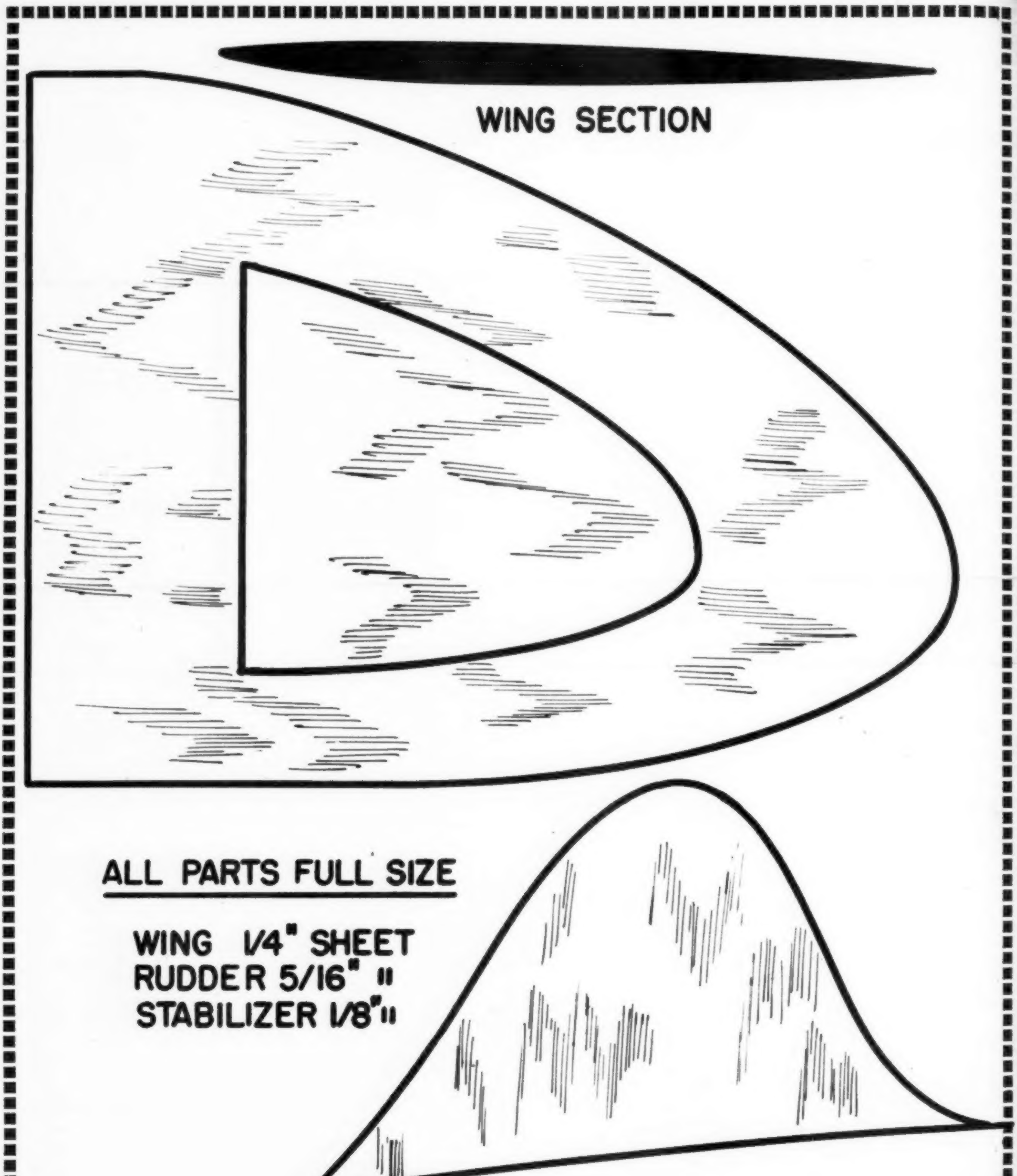
Choose a straight-grained piece of stock for the wing and cut it to the crossection shown. A good job will result if you take it easy and cut a little at a time. Be careful to sand the surface *with* the grain, otherwise you will cut the grain. Give the wing several coats of wood filler, being sure to sand between coats and ending with No. 9-0. Now cement the wing to lower part of the crutch between formers A and C with 0° incidence.

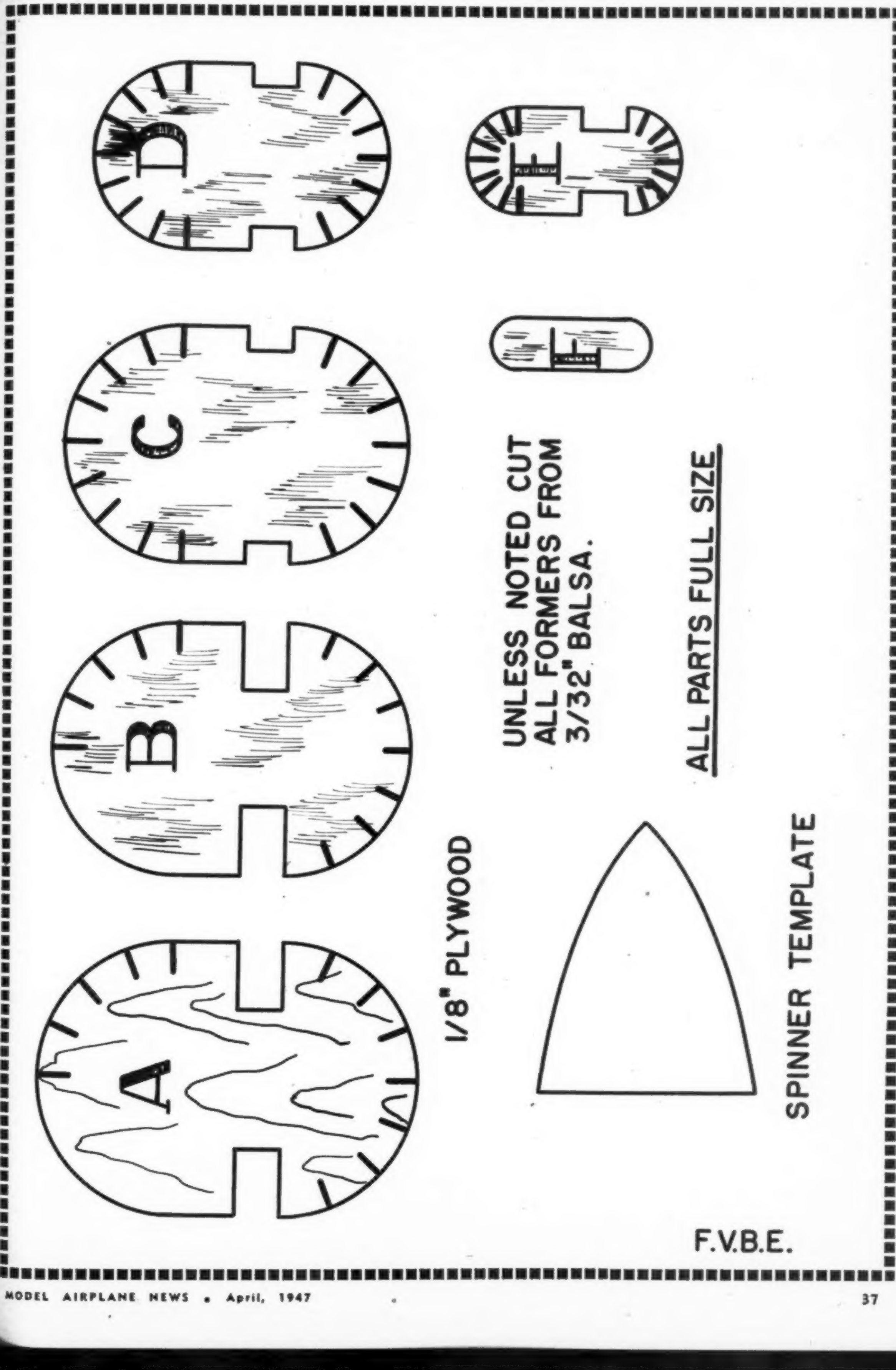
Cement stringers to the formers. They should be of very hard balsa—1/16" x 1/8"—or pine, which prevents the paper from sagging between formers. By wrapping a pencil with sandpaper and sanding lengthwise between stringers when smoothing the formers, the covering will not be able to adhere to them and a much neater job will result.

The ignition can now be installed. A timer is optional—the ship can fly and fly on its pole and no one will get tired. However, install the ignition equipment so as to get the ship to balance at 50%

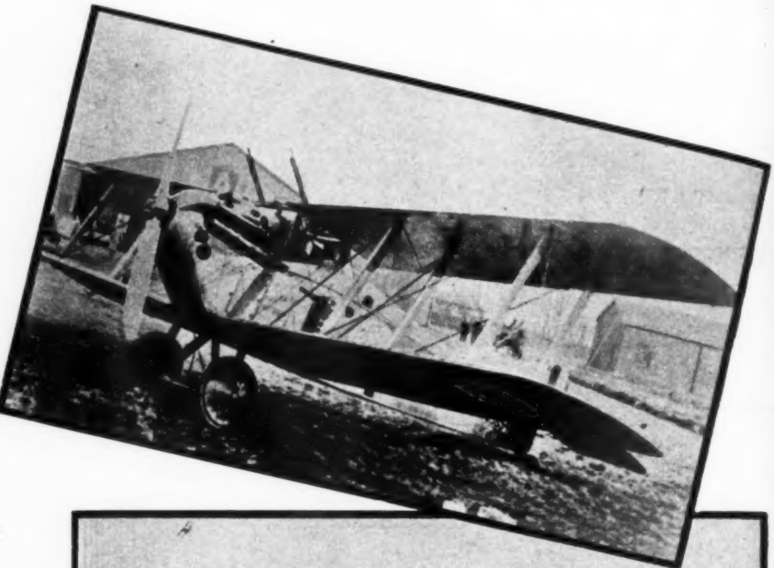
(*Turn to page* 58)


SCALE '1/2' SIZE
NOTE
USE HARD BALSA!
- WING -
1/4" SHEET
BASS
PROP
- STABILIZER -
1/8" SHEET
BALSA
CRUTCH 3/16" X 3/8"
BASS 3/8" SQ.
CEMENT
PLYWOOD
-RUDDER-
1/8" SHEET
STRINGERS OMITTED
FOR CLARITY
BALSA COWL
1/16" X 1/8"
BALSA
BLOCK
COIL
BATTERY
CUT COWL
TO FIT ENG.
1-1/4" F 2" E 2-1/2" D 2-1/2" C 2-1/2" B 2-3/4" A


WING SECTION
ALL PARTS FULL SIZE
WING 1/4" SHEET
RUDDER 5/16" "
STABILIZER 1/8" "
PROP TEMPLATE
F.V.B.E.


A
B
C
D
E
F
1/8" PLYWOOD
UNLESS NOTED CUT
ALL FORMERS FROM
3/32" BALSA.
ALL PARTS FULL SIZE
SPINNER TEMPLATE
F.V.B.E.

WORLD WAR I



by ROBERT C. HARE

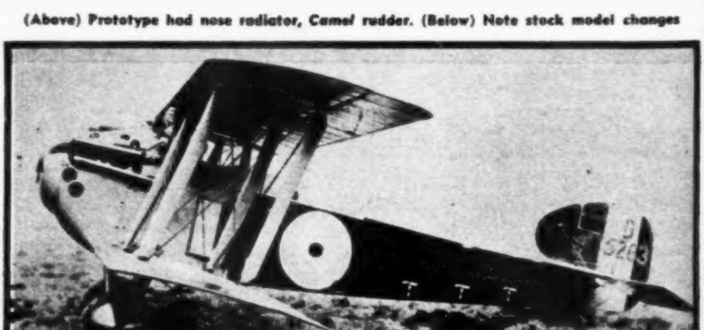
(Top) Sopwith Dolphin with extra twin centersection guns (Above) 5F.1 at the front

DURING the morning of August 21, 1918 a flight of five planes from the 35th Bavarian Staffel began a usual patrol of its part of the Arras district. As the Staffel's fighters climbed through the cloudless blue sky, a battle to the death was raging on the ground below. Canadian troops were beginning a drive that was to be one of the decisive operations of the First World War. Air activity of course was high. Allied aircraft seemed to be everywhere—patrolling, photographing, spotting artillery and reporting German movements back to corps headquarters.

Actually the 35th Staffel's leader, Oberleutnant Stark, had little interest in what was going on below. His concern was how to effectively carry out his patrol in a sky full of planes, the majority of which wore the bright red, white and blue insignia of the R.A.F. What worried Stark most as his flight approached the Front was a British type he did not immediately recognize. To him, it appeared strangely huge for a single seater; very ugly compared to an S.E.5. The new type seemed to have been bashed on its upper wings by some unseen force.

But German intelligence had informed staffel leaders like Stark well. As the new British ships moved in overhead preparing to dive on his little flight, he saw for the first time their pronounced negative stagger, recognized them immediately as Sopwith Dolphins, a type new to his area. Drawing his men into a tight circle, Stark waited for the attack. Seconds later the Dolphins came screaming down in single file, each firing a long burst as it came, then zooming back to its original altitude. The Dolphin pilots preferred to try out their new mounts cautiously, the usual practice during an initial operational flight with a new type. To this neither Stark nor his men objected because their intelligence had reported some quite startling details regarding performance and characteristics of the Dolphin. What the 35th Staffel group saw was enough to convince them that reports had been correct; that here indeed was a formidable new opponent.

(Above) Prototype had nose radiator, *Camel* rudder. (Below) Note stock model changes



Doodles and Visibility

The Sopwith Dolphin was an interesting example of a design which defied tradition in order to achieve an end result. Primary consideration was visibility for the pilot, a characteristic that had been only partly

(*Turn to page 74*)

LATEST MODEL MOTORS

ENGINE CONSTRUCTION DATA

	Class	Displacement, Cu. In.	Cylinder	Cylinder Attachment to Crankcase	Cylinder Head	Cylinder Head Attachment to Cylinder	Crankcase	Piston	Connecting Rod	Crankpin Bearing	Wristpin Bearing	Crankshaft Bearing	Number of Cyl. Ports	Crankcase Admission Valve
Cobey-Waite	A	.147	Steel	Screws	Alum. Alloy	Screws	Alum. Alloy, Die Cast	Steel	Alum. Alloy	No Bushing	No Bushing	No Bushing	4	
Arden "199"	A	.198	Steel, Alloy	Threaded	Alum. Alloy, Turned	Threaded	Alum. Alloy, Die Cast	Steel, Cr. Moly	Steel, Cr. Moly	No Bushing	Ball and Socket	Bronze or Ball Bearing	2	Rotary, Shaft Type
Cameron "23"	B	.230	Iron, Gray	4 Screws	Alum. Alloy, 17S-T	6 Screws	Zamak Alloy	Iron, Gray	Zamak Alloy	No Bushing	No Bushing	Alum. Alloy, 17S-T	3	
Bullet	B	.276	Steel	Screws	Alum. Alloy, Die Cast	Screws	Alum. Alloy, Die Cast	Mechanite Iron	Alum. Alloy, Die Cast	Bronze Bushing	No Bushing Bronze Pin	Bronze Bushing	2	Rotary, Shaft Type
Pierce	B	.297	Steel	Screws			Alum. Alloy, Die Cast	Steel						Rotary, Disk Type
Torpedo Special	B	.298	Steel, Alloy	Screws	Alum. Alloy, Die Cast	Screws	Alum. Alloy, Die Cast	Mechanite Iron	Alum. Alloy, Die Cast	Bronze Bushing	No Bushing Bronze Pin	Bronze Bushing	2	Rotary, Shaft Type
K & B Torpedo	B	.299	Steel	4 Screws	Steel	4 Screws	Alum. Alloy, Die Cast	Mechanite Iron	Alum. Alloy, Die Cast	Bronze Bushing	No Bushing	Bronze Bushing	2	Rotary, Shaft Type
Vivell "35"	C	.351	Steel, Bar Stock	2 Screws	Alum. Alloy	4 Screws	Alum. Alloy, Sand Cast	Iron, Cast	Alum. Alloy	Bronze Bushing	Bronze Bushing	Bronze Bushing	2	Rotary, Shaft Type
Stenmoor Bobcat	C	.421	Alum. Alloy, Die Cast, Steel Liner	4 Screws	Alum. Alloy	Integral	Alum. Alloy	Iron, Cast	Alum. Alloy, Die Cast	Bronze Bushing	Bronze Bushing	Bronze Bushing	2	Rotary, Shaft Type
Mighty Midget	C	.451	Steel	Threaded	Alum. Alloy	6 Bolts	Die Cast	Steel, 2 Rings	Steel	Cr. Moly	Cr. Moly	Bronze Bushing	4	
Madewell "49"	C	.488	Steel, Alloy	Screws	Alum. Alloy, 17S-T	Screws	Alum. Alloy, Perm. Mold	Iron, Cast	Alum. Alloy, Die Cast	Bronze Bushing	Bronze Bushing	Bronze Bushing	3	Rotary, Shaft Type
Vivell "Forty-Niner"	C	.489	Steel, Bar Stock	2 Screws	Steel	Integral	Alum. Alloy, Die Cast	Iron, Cast	Steel, Tool	No Bushing	No Bushing	Bronze Bushing	2	Rotary, Shaft Type
Vivell "Twin"	C	.569	Steel, Bar Stock	4 Screws	Steel	Integral	Alum. Alloy, Sand Cast	Iron Cast	Alum. Alloy	No Bushing	No Bushing	Br. Bushing 2 Bearings	2	Rotary, Shaft Type
Anderson Spitfire	C	.604	Alum. Alloy, Die Cast, Iron Liner	4 Bolts	Alum. Alloy, Die Cast	8 Screws	Alum. Alloy, Die Cast	Iron Alloy	Alum. Alloy, Forged	Bronze Bushing	No Bushing	Ball Bearing	2	Rotary, Shaft Type
Hassad	C	.605	Alum. Alloy, Bar Stock, Mec. Liner	6 Through-Bolts	Alum. Alloy, Bar Stock	6 Through-Bolts	Alum. Alloy, Sand Cast	Mechanite Iron	Dural, Hardened Bar Stock	Bronze Bushing	No Bushing	2 Ball	3	Rotary, Shaft Type
Thunderbird	C	.645	Steel	Screws	Steel	Integral	Alum. Alloy, Die Cast	Alum. Alloy, Die Cast, 2 Rings	Alum. Alloy, Die Cast	Bronze Bushing	Bronze Bushing	2 Ball	2	Rotary, Rear Shaft-Type, Impeller
Orr "65"	C	.647	Sand Cast, Mechanite Liner	Bolts	Sand Cast	Screws	Sand Cast	Alum. Alloy, Sand Cast, 2 Rings	Alum. Alloy, 24S-T	Oilite Bronze Bushing	No Bushing	2 Ball	3	Rotary, Disk-Type, Ball Bearing
Orwick "64"	C	.647	Steel, Alloy	Bolts	Alum. Alloy, 24S-T	6 Bolts	Alum. Alloy, Sand Cast	Nickel Steel	Alum. Alloy, 24S-T	No Bushing	No Bushing	Mechanite Bushing	2	Rotary, Shaft Type
Viking "65"	C	.648	Alum. Alloy, Die Cast, Steel Liner		Die Cast			Steel				3-Bearing		

by EDWARD G. INGRAM

Motors listed herein have reached the market since those covered in our December 1946 issue

INFORMATION about the construction, dimensions, and performance of 19 new makes and models of engines for model planes is presented in this article, which is supplementary to the one published in the December 1946 issue in which data on 51 current engines were shown. Hardly a month goes by but what at least one new model engine is introduced. Some manufacturers, however, have had difficulty in getting into active production because of business conditions and materials shortages. This probably explains why it has been difficult to obtain detailed information about certain recently announced engines.

Designed to operate on high octane aviation gasoline, outstanding features of the *Orr 65* racing engine (a product of a Michigan manufacturer) include high power output to weight, the provision of a ball-bearing rotary disk valve—an innovation in model engine design—and an alloy steel crankshaft supported on two ball bearings. The manufacturer states that the rating of .85 hp at 13,500 rpm was obtained through comparative tests with other engines, use of propellers of various pitches, and a tachometer, and that additional data will be supplied when further tests are completed.

The engine has a bare weight of 13-1/2 oz. Contributing to the high power output is the high compression ratio of 12.50 to 1, and the provision of two rings on the aluminum alloy piston to minimize gas leakage and insure high compression.

It is reported that after a four hour test at full power the engine showed no sign of failure or falling off in output. Like several other makes of model engines intended for use in racing cars and boats, as well as for model planes, sand castings are used extensively in construction of the *Orr 65*, this method of fabrication being employed for the cylinder, cylinder head, crankcase and piston. While engines made from sand castings tend to be slightly heavier than those constructed from die castings, the manufacturer of the *Orr* appears to have aimed at keeping the weight low through compact design, the crankcase in particular being unusually small for an engine that is somewhat larger in displacement than most Class C engines. Low engine weight is not so important in engines for model cars and boats where the main object is to attain maximum power to piston displacement, but it is a desirable characteristic for airplane engines when it can be achieved without loss of efficiency and reliability.

	Class	Displacement, Cu. In.	Bare Engine Weight, Ozs.	Weight per Cu. In. Disp., Lbs.	No. of Cylinders	Cylinder Bore and Stroke	Stroke-Bore Ratio (to 1)	Cylinder Compression Ratio (to 1)	Rated Horsepower	Revolutions per Minute at Rated Horsepower	Maximum Brake Horsepower	Revolutions per Minute at Maximum Brake H.P.	Max. Brake H.P. per Cu. In. Disp.	Engine Weight per Brake H.P., Lbs.	Recommended Propeller Dia., In.	Recommended Propeller Pitch, In.	Revolutions per Minute with Recommended Prop.	Type of Mount
Colby-Waite	A	.147	3.50	1.49	1	.562 x .593	1.06	4.50	1/10	8,500	....	....	....	....	..	..	.....	Bm.-Rd.
Arden "199"	A	.199	4.16	1.31	1	.635 x .625	.98	9.00	1/5	10,000	....	....	....	....	..	..	.....	Radial
Cameron "23"	B	.230	5.75	1.56	1	.625 x .750	1.20	7.00	1/5	9,300	....	....	....	....	10	5	9,000	Bm.-Rd.
Bullet	B	.276	6.50	1.47		.750 x .625	.83	9.00	...	.....	....	....	....	....	11 9	6 8	8,400 8,300	Beam
Pierce	B	.267	....	....	1	....	....	......	1/5	.....	....	....	....	....	..	..	.....	Beam
Torpedo Special	B	.298	7.75	1.63	1	.711 x .750	1.05	11.00	...	.....	....	....	....	....	12 9	6 8	8,300 9,500	Beam-Radial
K & B Torpedo	B	.299	7.50	1.51	1	.725 x .724	1.00—	7.50	.357	8,500	....	....	....	....	11 8	6 10	8,500 10,500	Bm.-Rd.
Vivell "35"	C	.351	7.25	1.29	1	.765 x .763	1.00—	....	1/5	9,000	....	....	....	....	11	6	9,500	Beam
Simmoor Bobcat	C	.421	7.50	1.11	1	.813 x .812	1.00	8.00	1/4	9,500	....	....	....	....	11	8	10,000	Beam
Mighty Midget	C	.451	7.25	1.00	1	.875 x .750	.86	8.00	1/6	12,400	....	....	....	....	9	9	10,000	....
Madewell "49"	C	.488	9.00	1.15	1	.891 x .783	.88	5.34	.60	15,000	....	....	....	....	12-13 9	6-5 8-10	10,000 12,000	Beam
Vivell "Forty Niner"	C	.489	7.50	.96	1	.859 x .844	.98	....	1/4	10,000	....	....	....	....	11	8	10,000	Beam
Vivell "Twin"	C	.560	14.00	1.56	2	.726 x .687	.95	....	3/8	9,000	....	....	....	....	12	6	9,000	Radial
Anderson Spitfire	C	.604	11.00	1.14	1	.937 x .875	.93	6.00	1/3	10,000	....	....	....	....	13	8	10,000	Beam
Hassad	C	.605	18.00	1.86	1	.905 x .940	1.04	13.80	...	.....	1 1/8	19,900	1.86	1.00	9 9	12 14	17,600	Beam
Thunderbird	C	.645	13.00	1.26	1	.968 x .875	.90	6.00	...	.....	....	....	....	....	10	10	11,900	Beam
Orr "65"	C	.647	13.50	1.30	1	.937 x .937	1.00	12.50	.85	13,500	....	....	....	....	..		.....	Beam
Orwick "64"	C	.647	12.00	1.16	1	.937 x .937	1.00	10.50	.754	10,500	....	....	....	....	13 13	6 8	.....	Rd. (Bm. Extra)
Viking "65"	C	.648	11.00	1.06	2	.812 x .625	.77	....	1/2	8,500	....	....	....	....	..	..	.....	Radial

ENGINE DIMENSIONS AND PERFORMANCE DATA

One component of the *Orr* engine that is not sand cast is the connecting rod, which is 24S-T aluminum alloy forging with an Oilite bronze bearing mounted in the lower end. The cylinder, which is bolted to the crankcase, is supplied with a Meehanite iron liner. Both bore and stroke of the cylinder are 15/16 in., which makes the displacement .647 cu. in. The cylinder head is lapped to the cylinder to insure a good fit, and is attached with screws.

A special impeller for supercharging is a feature of the Class C *Thunderbird*, which is built in Arizona by Scott Motors Inc. As an additional aid to high volumetric efficiency, dual intake and exhaust ports are provided; combined width of the two exhaust ports is 1-3/8 in. The supercharger impeller is swaged and induction brazed to the special shaft-type rotary valve located at rear of the crankcase. The unit is driven by means of an extension pin on the crankshaft which engages with the impeller. The cam for operating the breaker points is ground on the valve shaft. It is pointed out that because of the high speeds at which model engines run the direct driven impeller operates at about as high rpm as the geared supercharger impellers of large aircraft engines. For example, when a Pratt & Whitney 1200 hp aircraft engine with a supercharger impeller gear ratio of 7.15 to 1 is operating at the cruising speed of 2000 rpm the impeller is turning 14,300 rpm. It is stated that using special fuel the *Thunderbird* will turn 11,000 to 12,500 rpm, and an estimated 14,000 rpm when the model is airborne, so that the speed at which the impeller operates is about the same as that of the large aircraft engine impeller.

It may be pointed out that the meaning of the term "supercharging" as used in connection with model two-cycle engines must be regarded as somewhat narrower than that applied to four-cycle engines. Since the combustion chamber intake and exhaust ports of a conventional two-cycle engine are open at the same time, it is obviously impossible to force into the cylinder a charge greater than the volume of the combustion chamber, for the excess fuel mixture would pass out of the exhaust port. Forced induction, however, may aid in delivering a nearer to maximum charge where the charging time interval is short (that is, at high engine speeds) by increasing the flow of the fuel mixture through passages that are necessarily somewhat restricted. Increasing the crankcase compression ratio should produce a similar result, that is, increase the volumetric efficiency, but the degree of crankcase compression that can be attained in this way is limited by constructional considerations. In both two- and four-cycle engines an impeller aids in diffusing the fuel mixture.

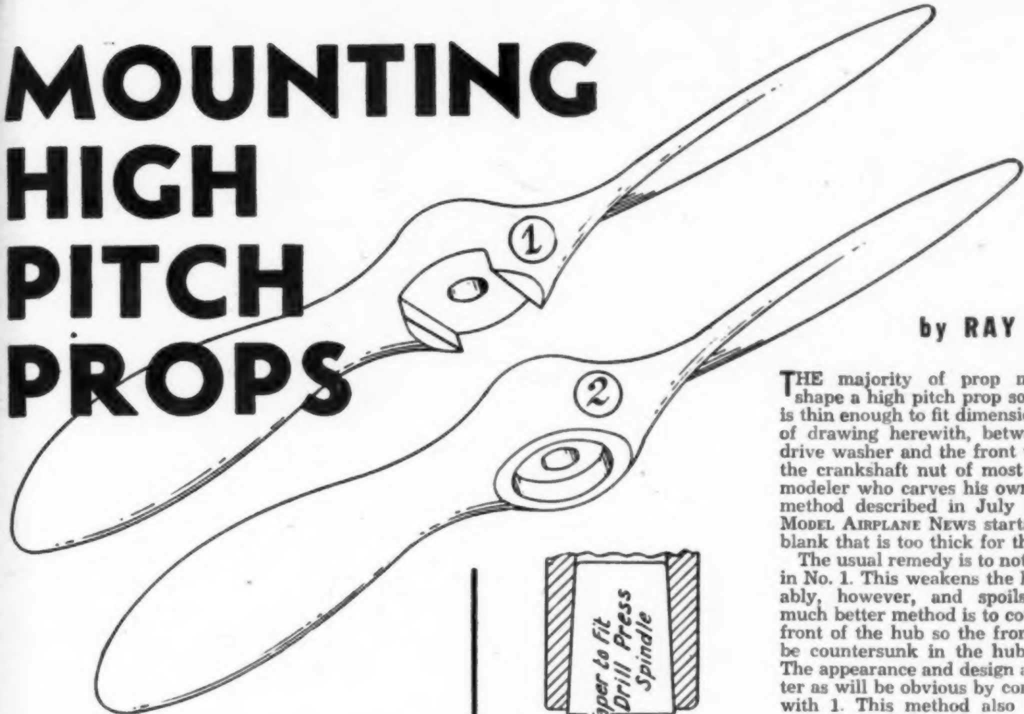
The *Thunderbird* is provided with a metal instead of a plastic tank to permit operation on an alcohol-ether mixture. Both the spark and mixture controls are located at rear of the engine for convenient operation. Steel is used for the cylinder and, of course, for the ball-bearing crankshaft. The other important engine components are aluminum alloy die castings, including the piston which has two rings, and the connecting rod which has bronze bushings. The compression ratio is 6 to 1 and the engine weight 13 oz.

Described as a competition engine designed with one object, that of optimum performance, the *Hassad*, which has a displacement of .605 cu. in., is claimed to develop the remarkably high output of 1-1/8 brake hp at 19,900 rpm. Designed by Ira J. Hassad, it is stated to incorporate what is termed "resonic" timing, a feature said to have been developed through laboratory research work, exhaustive trials and the cooperation of physicists. It is hoped some information about this timing principle and the (*Turn to page 54*)

This is the Cameron "23"

K & B Torpedo of .299 cu. in.

MOUNTING HIGH PITCH PROPS



by RAY RUSHER

THE majority of prop manufacturers shape a high pitch prop so that the hub is thin enough to fit dimension A, in No. 3 of drawing herewith, between the prop drive washer and the front washer under the crankshaft nut of most engines. The modeler who carves his own prop by the method described in July 1943 issue of MODEL AIRPLANE NEWS starts with a prop blank that is too thick for this dimension.

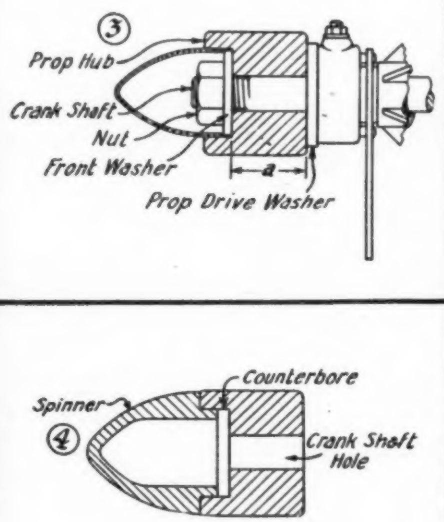
The usual remedy is to notch the hub as in No. 1. This weakens the hub considerably, however, and spoils fairing. A much better method is to counterbore the front of the hub so the front washer can be countersunk in the hub as in No. 3. The appearance and design are much better as will be obvious by comparing No. 2 with 1. This method also permits convenient use of a spinner of metal, or turned wood or balsa as shown in Nos. 3 and 4 respectively.

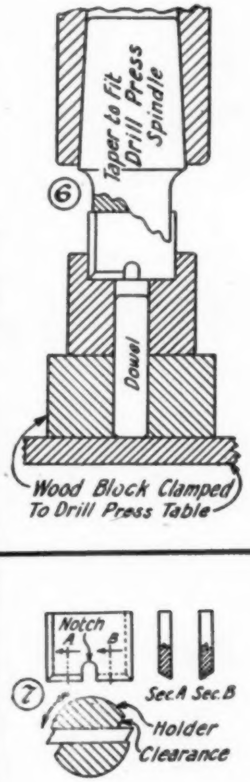
First secure a smaller front washer than the size usually furnished with the engine. An ordinary iron washer 3/4" in diameter for a 1/4" shaft is about right. Then proceed to make a special counterboring tool (see No. 8) to fit your lathe or drill press as shown in Nos. 5 and 6 respectively. The tool is merely a cutter blade and a holder for it is turned from wood, preferably maple. The holder has a slot in its working end to frictionally receive the cutter blade. The blade can be pinned or clamped in the holder, but a friction fit is satisfactory.

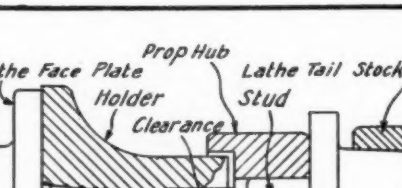
The cutter blade can be made in a few minutes from a 1/8" x 5/8" piece of strap iron, the length being 3/4" for a 3/4" diameter counterbore. Notch the center and file the ends and bottom as shown in No. 7 at an angle of about 30°. Force the blade into the slot of the holder.

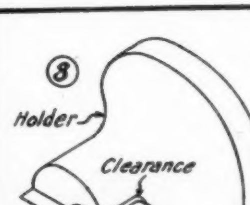
When counterboring a prop, it should be accurately centered as by a stud turned on a back plate if you use a lathe, or a dowel in a hole drilled in a wood block if you use a drill press. To further insure accuracy, oscillate the prop through a 90° arc while counterboring and finish by turning it 180° and again oscillating it through 90° while counterboring. Use a stop to limit depth of cut so the remaining thickness of the hub will permit a full nut length of threads as shown in No. 3.

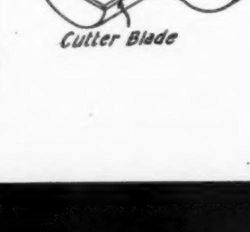
A counterboring tool of the type described works best when rotating 2500 to 3000 rpm. If the cutter edges are carefully honed it will counterbore two or three dozen props before requiring retouching with the hone. If made from cold rolled steel it will hold its edge longer, especially if it is case-hardened after honing. To finish the counterbore smoothly for varnishing after it is cut, a special sanding drum can be turned from a block of wood screwed to the face plate of the lathe. Both the end and the periphery of the drum have fine abrasive paper or cloth glued to them for finishing the counterbore bottom and its cylindrical portion.





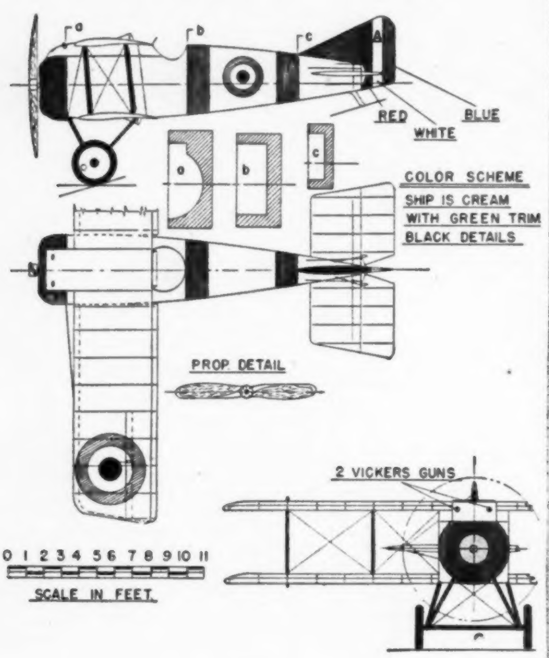






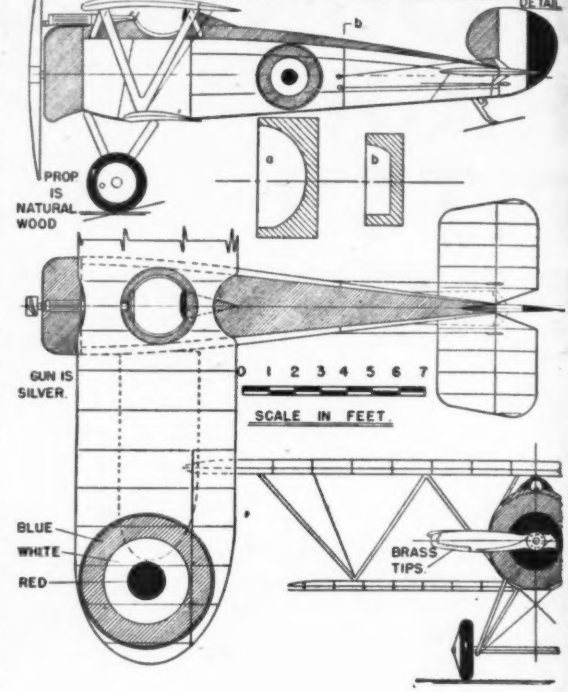
ARMSTRONG-WHITWORTH "ARMADILLO" OF 1918.

THIS SHIP WAS POWERED BY A 220 H.P.-BR2 ROTARY ENGINE. IT WAS CAPABLE OF 140 M.P.H. AT 1,000 FEET



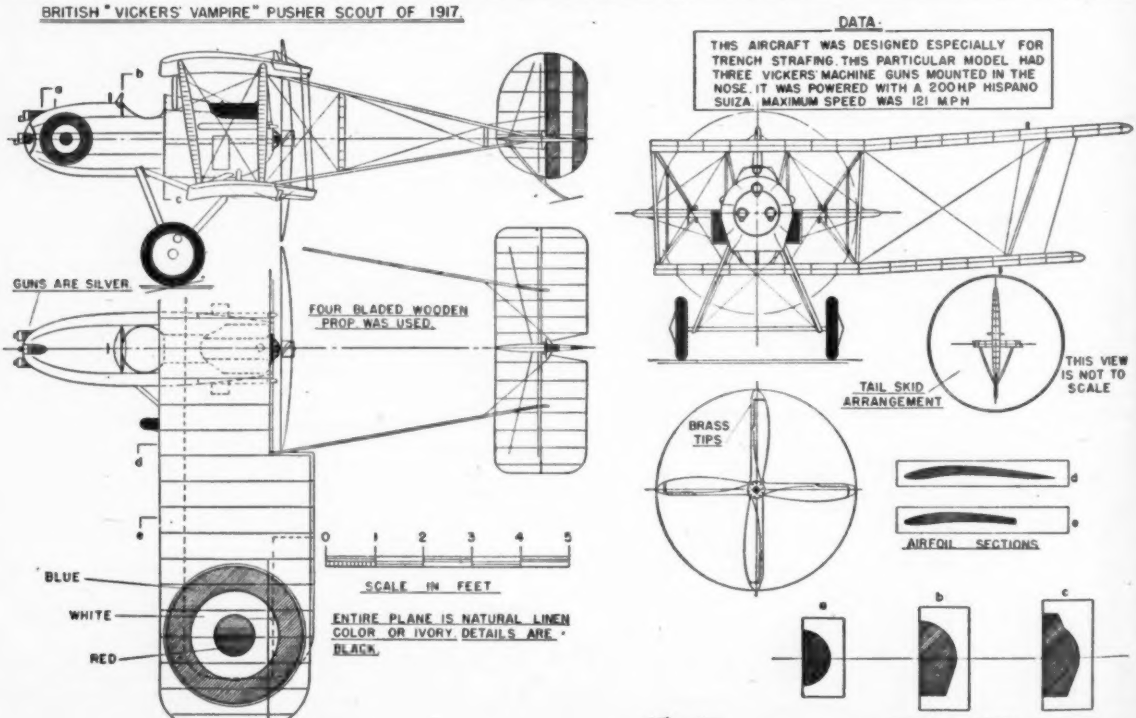
"AVRO SPIDER" - BRITISH FIGHTER OF 1919.

POWERED BY A 180 H.P. BR. ROTARY. HIGH SPEED WAS 124 M.P.H. SHIP IS ALL WHITE WITH BLUE TRIM AND BLACK DETAIL



RARE SHIPS FROM WORLD WAR 1

BRITISH "VICKERS' VAMPIRE" PUSHER SCOUT OF 1917.



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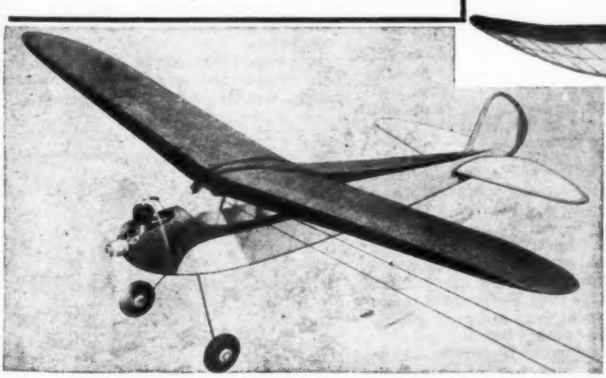

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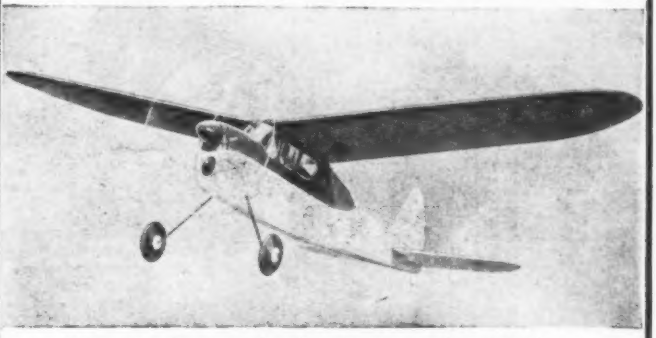

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Speed Cowls

(Continued from page 20)

These two speedsters carry the simplest cowling which leaves the "pot" entirely out in the breeze.

would be interesting to see what actual wind tunnel tests will reveal here. If there is any advantage at all it is gained with a minimum of effort, and there is no sacrifice in accessibility or cooling. One model equipped with a cowl of this type which we have seen uses a two-piece hinged cowl with the plywood fins cemented to one of the halves at the center-line.

FIG. 3—The third suggestion is not exactly new, though it is seldom seen in modern speed models. It is our choice since it is a compromise between the other principal methods of cowling, retaining advantages of each and avoiding some of the objectionable features of each. The plug is still accessible, the base of the cylinder is completely housed, and there is no increase in frontal area. The main cylinder turbulence is materially reduced even though there is slight clearance behind the cylinder to allow a cooling circulation of air. Our own model, which employs this cowl arrangement, has its upper fuselage half carved of balsa and hollowed. The cylinder fairing is carved as an integral part of this turtleback, the whole unit being removable.

FIG. 4—In addition to Mr. Newberger's success with it, the neat appearance of the fully cowled engine is apt to entice us into using it whether or not we are convinced it adds miles per hour. Most such cowls we have examined are really pressure cowls with a small front air inlet and a larger outlet at the rear. Proponents claim that the small front vent not only admits adequate air for cooling but for the carburetor intake as well. Under the stress of contest flying, however, the fact that the engine is virtually sealed up is a disadvantage should anything go wrong. The inside stream of air is something to wonder about in appraising this type of cowling. Also the clean lines are broken by the front and rear openings, and finally there is the fact that frontal area is necessarily increased. Inexperienced builders often come up with cowls of such bulk and crudeness that, beyond any doubt, they are nothing but a hindrance to the model. That the function of the cowl is often not fully appreciated is borne out by the numerous times we have seen cowls with fancy grilled air intakes but lacking air outlets altogether! Without a rear vent for circulation the front opening is virtually useless.

There are many other cowl types, some a combination of the above. We have seen some which ignore the cooling fins on the cylinder by exposing only the head fins to the air stream. Then there are the fully submerged types, often made more complex by extension shafts and universal joints which, though unique, lack so much in accessibility as to hardly be worthwhile.

It is hoped that this brief discussion will help you decide on the best cowling arrangement for your particular case.

"Model Airplane Course for BEGINNERS"
Starts in next issue of **MODEL AIRPLANE NEWS!**

The Ghoul

(*Continued from page 17*)

cut from 3/16 in. sheet bass or some other hardwood and glued in place while the fuselage sides are still on the plan.

While the sides are drying, cut out the crosspieces from 1/8 in. x 3/16 in. stock. At this point note that the cabin detail is drawn only above the center line on the top drawing. Do not confuse the fuselage sides with the 1/8 in. x 1/4 in. stringers. Next cut the 1/8 in. plywood firewall to shape and drill the holes for the ignition. Remove the sides from the plans and trim off any extra glue or rough spots before assembly. Neatness starts in the construction not in the finishing. Use care in placing the crosspieces, wherever possible aligning them with other members of the fuselage.

The next step is to build up the bottom formers from section B through L. 1/8 in. x 3/16 in. balsa is used, cutting carefully to insure accuracy. Square each section with a right angle as the glue dries. After this has been completed select a rather hard piece of 1/8 in. x 1/4 in. for the bottom stringer and glue in place.

The same procedure is followed for top of the fuselage, but allowing the top stringer to extend an inch past section E for the cabin structure.

You will notice on the crossection drawings that an 1/8 in. sq. stringer is glued on the 3/16 in. sq. to build up the contour. This has been eliminated from the plan to prevent confusion, just as the stringers have been discontinued at section F.

It is now necessary to glue these 1/8 in. squares in place before constructing the cabin. For the time being it will be sufficient to run it back only as far as section E. Cut the cabin fairings from 1/16 in. sheet, and cut the wing platform, shown in the top view, from 1/8 in. sheet, gluing at the proper angle to fit the centersection. Notch as indicated for the fairings and also for the 1/8 in. stringers. Once this has been completed glue them in place, later adding the 3/16 in. x 3/8 in. braces. This for the time being completes the cabin. Do not put in the celluloid until later.

Those who wish to use the conventional two wheel landing gear may do so by changing the outline slightly and bolting it to the firewall. The three wheel gear, while a slight handicap in contests, is excellent for sport flying and saves many a prop.

The nose gear has a shock absorber built in, allowing about 3/4 in. rearward travel. Bend the spring from .045 in. piano wire and hold in place with two washers soldered to the gear.

The rear wheels do not need the shock absorbers and therefore are simple to install. Hold in place with strips of hardwood to prevent travel in any direction. Align wheels so the model coasts in a straight line when pushed along the ground.

The next step is the one which will make or break the model, depending entirely upon you. No motor can function properly on a butchered ignition system so care now will save naughty words out on the flying field.

The original ship carried 4 pencells wired in parallel series which are excellent for everyday flying but make the plane one ounce overweight. An average set is good for over 75 flights with a booster or around 50 without one. Use whichever you prefer. For an easy way to make foolproof terminals solder a washer

on the plus and minus lead from the battery set, which connects to a plus and minus bolt protruding from the front of the battery box. Slip a nut on and your main ignition gremlins have been licked. A small hatch makes replacement of a new set of cells easy.

For a *Forster* engine the coil was placed between sections B and C, so locate your coil according to the weight of the engine used. Keep the length of the wires to a minimum and locate the condenser as close as possible to the engine. The timer should be set flush with the fuselage side in order that it be recessed when the stringers are added. A small hatch will prevent dirt and oil from fouling it up.

Once the ignition has been completed add the rest of the stringers of the size specified. Continue them all the way back spacing them evenly as possible. Cut the tail block from soft balsa and carve to the camber of the stabilizer airfoil. A 1/4" slot is now cut in the block to serve as a keyway for the tail. With a sharp knife or razor cut the stringers down until they fair neatly into the fuselage outline.

Now while we're nice and ambitious, temporarily tack a block of balsa on the firewall with a few drops of glue and carve the lower cowling to shape; remove it from the body and carve out to 3/16" thickness. Cut out the necessary holes for the exhaust, sparkplug removal, air scoop or grillwork and the air vents. Once this has been accomplished it may be set aside for a few minutes while the motor mounts are made.

These mounts are bolted to the top of the lug so when the motor is inverted the lugs are easily reached. Removal of the four bolts which hold the mounts to the motor mount bearers permits removal of the engine and mounts.

Now place the motor mounts temporarily in place and glue the bottom cowling on permanently. Only the upper section is removable. While this is drying, drill the four holes as shown on the plans, through the cowling, motor mount bearers and the motor mounts. Countersink the nuts into the mounts and add small plywood pieces under the bolt heads to keep them from biting into the balsa. Once the cowling is dry trim it up wherever necessary and add the grill work. The top section is very simple to make being held in place by two small rubberbands.

Before covering the cabin with celluloid it is a good idea to place your name and address inside where it won't be exposed to the elements if lost.

Soldering a small extension on the needle valve, the addition of a spinner, and a final once over lightly with the sandpaper sums up the construction.

No trouble should develop in the covering stage as there are no difficult curves to contend with. If you want an almost indestructible covering on the body after the Silkspan has been doped several times, apply a second layer with the grain running in the opposite direction to localize any rips that may develop.

If the wing warps when covered don't worry about it until the wing is completely doped; then run good hot faucet water over the panel in question, twist it in the opposite direction and dry quickly over a gas stove. This has the same effect as steaming them out but is a little easier.

Almost all model builders are "Eager Beavers" when it comes to test flying. It's always better to wait for a calm day than to risk a new ship in the crucial test flights. As a pre-flight check, examine the wing and stabilizer for any new warps or mis-alignment. Check the motor for pro-

(*Turn to page 48*)

per downthrust or side thrust. Make certain the tail assembly is keyed properly as any sudden change would be disastrous.

Once you are satisfied with your visual inspection, hand glide the ship in tall weeds or have someone catch it for you. It should glide approximately straight without diving or stalling. Add or remove the incidence until the glide is satisfactory. The tail block may now be carved to fit this new adjustment.

While still fervently praying, make the first flight under low power, observing the characteristics and if corrections are necessary they may be made. It should climb to the left in wide circles under low power, and climb in tight left spirals as the torque is increased under full power. The original *Ghoul* and the forerunners of the design spiraled left and glided left, thereby eliminating any abrupt stall as the motor cut. Remember, a *Forster* is a lot of power for a ship this size so increase the revs slowly. Keep the motor run down or the *Ghoul* will go to "Model Heaven". Save it for the contests. Happy Hunting!

Design Forum

(*Continued from page 22*)

have taken the first road because, unless their models were inherently stable they would crash. Obviously no pilot could fly in them to guide them.

So the history of model aeronautics is largely that of the development of stable aircraft. This is especially true of the period during which gas models were developed. These, in effect, were miniature full scale aircraft and their aerodynamic forces were more nearly like full scale planes than were rubber powered models, because of their greater weight and speed. Considerable difficulty at the start of their development and even up to the present has been encountered in building stable gas powered models. It has been chiefly a matter of guesswork or copying some successful design without knowing why the model performed correctly.

A few ingenious and determined young experimenters learned this secret and have consistently designed and flown successful gas models. Others less inclined to thinking out their problems found it easier to copy these designs and merely enjoy flying them. Unfortunately they copied many poor designs as well as good ones, with the result that every contest is well punctuated with crashes and disappointed modelers.

The most troublesome instability characteristic has been spiral diving tendencies. This has troubled not only the modeler but also full scale aircraft designers who attempted to fly pilotless aircraft as bombs or target planes.

This outstanding problem has strongly impressed Robert Grindel of Havana, Cuba, who undertook to lay out a preliminary design for a gas model that will be inherently stable in all ways. He says he read many articles on the subject and gave it considerable thought. His design, shown in Fig. 1, indicates that he has absorbed completely the basic idea for insuring spiral stability.

Briefly, to obtain spiral stability there are just two things to consider: First, center of lateral area—that is, the center of side projected area, C.L.A., must be very near to or on a line running through the center of gravity, C.G., and parallel to the thrust line. In computing the C.L.A. the projection of the wing must

(*Turn to page 51*)

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be doubled because there are two dihedral upturned wingtips presenting side area. If double fins are used the fin area must be doubled, and the same with wheels if there are two.

The center of side area may be determined by cutting out a cardboard pattern to exact shape of the model's projected side view. Where it is necessary to double the side area, paste an extra sheet of cardboard over that part of the silhouette, for instance the wings. To determine the center of area, balance this cardboard silhouette on the point of a pin, moving the point of support until the cardboard balances horizontally. This point then will be the C.L.A.

The second requirement is that the neutral axis of the side area is horizontal or sloped up slightly toward the front.

This axis is a line drawn through the center of forward lateral area and rearward lateral area, marked F and R. These two centers may be determined by cutting the cardboard in half through the C.L.A. and then determining the center of each half. When this axis is slanted slightly upward the airplane will roll with nose pointed up so that it climbs; and if it has a spiral tendency it will spiral climb. If this axis is sloped downward, it will bank with the nose down and produce a tendency to spiral down or dive. The degree of lateral bank or spiraling tendency is determined by position of the C.L.A. If it is above the C.G. spiraling will be acute. If on a level with or below it, little if any banking or spiraling will result. The neutral axis obviously is not important if the plane does not spiral or bank; but if it does, it is important because it determines the way the model will roll, with the nose up or down.*

You will note that Mr. Grindel has shaped his model so that the C.L.A. is very low, and with the low rearward extending fuselage and high area in the front the neutral axis will slope upward as shown. He has incorporated another feature which is extremely important: he kept the thrust line high, thereby not only insuring a high C.G. relative to the C.L.A., but he also shortened the looping couple between the thrust line and the line of resistance. The lower the thrust line the larger is this couple, therefore the greater is the looping tendency. Obviously, greatest duration is obtained by a straight, steady, steep climbing flight with no looping.

Mr. Grindel's model should achieve this result completely. First, it will have a tendency to fly straight because the C.L.A. is low and the neutral axis is sloped up. Second, it will climb steadily without looping because the thrust line is high and tends to keep the nose down rather than to pull it up. We suggest that Mr. Grindel set his wing at 3 to 3½ degrees, and his stabilizer at plus 1/2 to 1 degree. Various settings between these limits should be tried and the one that will give best results selected. A plane such as Mr. Grindel shows here, built to the limit of lightness, should equal in performance any plane flown on a contest field.

* *

James McCullough of El Monte, Calif., and Arthur Runyon of Franklin, N. J., have submitted designs for swept forward wing gas models that are almost identical. The only fundamental effective difference between the two is that Mr. McCullough uses a high fin and Mr. Runyon

*Charles H. Grant's Theory of Rotational Stability.

a low fin. (A composite view of the two planes is shown in Fig. 2) They are seeking to develop some new and unusual form of aircraft, gas models in particular. Both believe that possibly this arrangement will solve the stability problem of tailless airplanes without loss of efficiency.

As far as average considerations are concerned this is true. In the past a number of full scale aircraft were built along this line. However, there is one great difficulty which is not at first apparent. This airplane will fly beautifully in still air or where conditions are not disturbed; but in breezy weather or during certain types of maneuvers this type is dangerous for full scale work and unstable as a model. It is stable longitudinally because the wings at the tips are of much greater angle, approximately a 10 degree angle, than at the center, which is about 3 degrees to the line of thrust. The center part of the wing which is more negative is back of the tips; consequently it acts as a negative stabilizer.

When the plane noses up the lift of the center and rear position of the wing increases to a greater extent than the lift at the tips. This action lifts the rear part of the plane, correcting the nosing up tendency. The opposite is true if the plane noses down. However, the fact that the tips are of greater angle than the center part of the wing causes directional or lateral instability or both under certain conditions. This results because the tips of the wings stall before the center portion of the wings. It can readily be seen that in disturbed air one tip may stall before the other at high angles of attack.

This stalling action is sharp and abrupt and causes the plane to roll sideways suddenly about its longitudinal axis because of sudden loss of lift on one wing tip; or it may yaw sharply about its vertical axis due to sudden increase in drag caused by the stalling. This makes such type of plane very cranky, with the sudden change in lift and drag taking place at points remote from the center of weight, producing large disturbing moments. In full size airplanes it is the practice to wash out the wings—that is, reduce the angle at the wingtips rather than increase it so that the wing center will stall before the wingtips. This condition is absolutely essential to the stability and ease of handling of civilian aircraft. Washing out the wings in this way instead of washing them in as indicated in Fig. 2 prevents sudden stalling and then falling off sideways.

We cannot advise use of this type of model aircraft except as a means of finding out *what not to do*. As a contest model, we can say with almost certainty that it will be unsuccessful unless some other factor is brought into the problem that will correct the unstable tendencies mentioned here.

• •

Harold Geres of Van Nuys, Calif. submits the design of a civilian plane with the new type of lateral and directional control shown in Fig. 3. The general design of the plane itself is excellent. It should be a convenient and efficient plane for the average flier. To obtain lateral and directional control the wingtips are hinged so either one may be turned up, forming dihedral angles of various degrees. Mr. Geres claims that when the wingtip is pulled up, as indicated in the front view, lift on this wing becomes less than on the opposite one so that the plane banks or rolls toward the side of the up-

turned wingtip. Because of this roll and bank the ship turns in direction of the roll, thereby providing directional control. Lateral control is effected by raising either wingtip as desired to reduce lift on any wing.

Unquestionably, lift on a wing can be reduced by raising the wingtip in this manner; also control can be affected as described. There is another question, however, that one must consider when any such mechanism is used, namely: "Can it be done as simply or more simply, as cheaply or cheaper than means used at present to accomplish the same ends?" Our answer in this case is "No, it can not."

We believe it is much simpler to provide a one-way aileron system where each aileron is part of the wing trailing edge at the tips. Each aileron may be turned up as desired to reduce the lift on and thus to lower either wing. Such an arrangement does the same job as Mr. Geres' device with less complication. By raising each aileron as desired without lowering the opposite one, drag is reduced on the wing and *not* increased as in the case of ailerons on average planes.

Mr. Geres' chief argument for his type is that it does not increase or decrease drag and thereby cause yawing moments. He believes a smoother flight will result. By using trailing edge ailerons as described above the same condition may be obtained as in Mr. Geres' device. Chief advantage of the trailing edge aileron is that it is much lighter, that the aileron does not support a fairly large percentage of the lift load at any time as is the case with Mr. Geres' wing tip aileron. Therefore, stresses on the hinges of the trailing edge type are much less than on the tip type. With the latter, the force required of the pilot to operate the controls would be prohibitive and the stress on the controls would vary with any set position of the wingtip. With such a device a pilot would be worn out before he had flown many miles. Any mechanism that may be incorporated to reduce this strain would only complicate the structure and add weight. In simple words, we think this device is workable but not practical and advisable.

NOTICE

We wish to make a correction of statements we made in our columns in a previous issue.

We assumed that miniature jet engines require pressurized fuel systems as suggested by Robert Ronay. We learn from William L. Tenney, an expert on this type of engine, that they do not require such systems. "Both the gravity feed and spring plunger systems should under no circumstances be employed. With these systems, fuel flows whether or not the engine is running thereby creating a serious fire hazard. Jet engines employ simple suction like miniature reciprocating engines. With this system no special tanks are required and there is no fire hazard."

• •

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2 *Above Acme*
Below Consolidated Vultee Aircraft Corp.
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Latest Model Motors

(*Continued from page* 40)

claimed advantages can be presented in a future article. It also is stated all the technicians who are building the engine were formerly with the University of California, Division of War Research.

The engine is intended for model racing cars, boats and planes, a propeller adapter being supplied for the latter use. Since the compression ratio of the *Hassad* is 13.80 to 1, highest of those ratios listed in the tables, the operator is warned against using straight methyl-alcohol (methanol) fuel because of detonation, which may cause a dangerous rise in temperature. It is noted that the main purpose of using methyl-alcohol is to lower the temperature of the intake tract and thus allow a greater charge to enter the cylinder; but unless the fuel is chemically treated it cannot be used with a compression ratio much higher than 9 to 1. A particular brand of racing fuel is recommended for the *Hassad*. When tuned for racing it is stated a condition called "splattering" should be noted when the ignition is shut off. This is caused by the heated sparkplug firing the engine for a couple of seconds, and denotes optimum fuel efficiency, as the engine should be at a high temperature for best performance. The sparkplug porcelain should become a light tan color, as a gray-white denotes too lean a mixture and a dirty brown or black too rich a mixture.

The cylinder, which incorporates twin exhaust stacks, is machined from aluminum bar stock, and the fins of the detachable cylinder head are milled on to minimize distortion. Through-bolts attach the head and cylinder to the sand cast aluminum alloy crankcase. Meehanite iron is used for the cylinder liner and piston. The dural connecting rod has a bronze bushing at the lower end. Two ball bearings having diameters of 5/8 in. and 1/2 in. support the chrome-moly steel crankshaft. A shaft-type rotary valve is used. The engine speed of 17,600 rpm with a 9 in. diameter, 12 in. pitch, or 14 in. pitch propeller is stated to have been certified by the U. S. Bureau of Standards. The weight of 18 oz. is somewhat higher than most engines of this displacement.

Vivell Motors has brought out an entirely new line of engines consisting of the Vivell *Twin 60*, Vivell *Forty-Niner*, and Vivell *Super 35*. All are two-port engines with shaft-type rotary valves, cylinders machined from solid bar stock, and cast iron pistons honed and lapped to fit the individual cylinders. Cylinders of the *Twin* and *Super 35* are flanged at the lower end and attached by four screws to the aluminum alloy crankcase. The aluminum alloy crankcase of the *Forty-Niner* is extended up and around the cylinder nearly to the level of the cooling fins. The cylinder is attached to this extension with screws. The connecting rod of the *Twin* is machined from aluminum alloy and fitted with a bronze bearing and bearing caps at the lower end, the caps being necessary for assembly purposes where a two-bearing crankshaft is used. The connecting rod of the *Forty-Niner* is machined from tool steel and supplied with a bronze crankpin bearing. Cast aluminum alloy is used for the rod of the *Super 35*, and bronze bushings are fitted at both upper and lower ends. All three engines have crankshafts machined from alloy steel bar stock, hardened and ground, and bronze-bushed main bearings. A detachable cyl-

(*Turn to page* 56)

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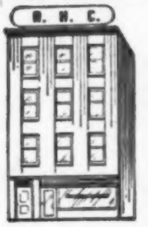

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inder head machined from aluminum alloy and attached with four screws is a feature of the *Super 35*, while the other models have integrally-cast heads. The *Twin* turns a 12 in. diameter, 6 in. pitch propeller 9000 rpm; the *Forty-Niner* an 11 in. diameter, 8 in. pitch propeller 10,000 rpm; and the *Super 35* an 11 in. diameter, 6 in. pitch propeller 9500 rpm. The *Twin* is designed for either beam or radial mounting.

Another addition to the quite large group of Class C engines with a displacement .604 cu. in. now on the market is the Anderson *Spitfire*, introduced by the Mel Anderson Mfg. Co. Brake horsepower tests of this engine have not yet been carried out, but it is rated 1/2 hp at 10,000 rpm and is stated to turn a propeller 13 in. in diameter at this speed. The compression ratio is 6 to 1, and bare engine weight is said to be 11 oz. Aluminum alloy die castings are used for the cylinder, cylinder head and crankcase. The cylinder is attached to the crankcase with four hex head bolts, and the head to the cylinder with eight machine screws. The drop forged aluminum alloy connecting rod has a bronze bushing at the lower end. Alloy iron is used for the piston and the cylinder liner. The crankshaft is provided with the type of ball bearing which takes care of both radial and thrust loads. The engine is of the two-port type with a shaft rotary valve and has a cylinder bore of 15/16 in. and stroke of 7/8 in.

A postwar model of the *Mighty Midget* engine has been placed on the market. With a 7/8 in. bore and a 3/4 in. stroke, this engine has a displacement of .451 cu. in. The compression ratio is 8 to 1. The crankcase, crankcase back cover, and exhaust stack are die castings. The cylinder, piston and connecting rod are of steel. The upper and lower rod bearings are chrome-moly steel and the main crankshaft bearing is bronze-bushed. The cylinder is threaded and screwed to the crankcase. Six bolts attach the aluminum alloy cylinder head to the cylinder. The propeller sizes recommended are 9 in. diameter, 8 in. pitch, or 12 in. diameter, 7 in. pitch for free flight. It is stated the engine turns these props 10,000 rpm.

Another engine again to appear on the market is the *Madewell*. A bore of .891 in. and stroke of .783 in. provides a displacement of .488 cu. in. For free flight a 13 in. diameter, 5 or 6 in. pitch propeller is recommended, which it is stated the engine will turn 10,000 rpm. The same speed is attained with a 12 in. diameter, 6 to 7 in. pitch propeller used for precision U-control. A speed of 9000 rpm is attained with a 9 in. diameter, 8 or 9 in. pitch propeller used for regular U-control operation. Bare weight of the engine is 9 oz. The cylinder is machined from alloy steel bar stock and attached with screws to the aluminum alloy crankcase, which is cast in a permanent mold. A cast iron piston and die cast aluminum alloy connecting rod are used. All bearings are bronze-bushed. The compression ratio is 5.24 to 1.

Viewed from the angle of the stroke-bore ratios used in the model engine field, the *Cameron 23* is a relatively long stroke engine, the cylinder bore of 5/8 in. and stroke of 3/4 in. giving a ratio of 1.20 to 1. The engine has a compression ratio of 7 to 1, a bare weight of 5-3/4 oz., and is stated to turn a 10 in. diameter, 5 in. pitch propeller better than 9000 rpm. Gray iron is used for the cylinder and piston to provide the same coefficient of

expansion and permit a closer fit of the parts. A curved baffle and profiled bosses are features of the piston design. The cylinder is attached to the die cast Zamak alloy crankcase with four screws. Both the connecting rod and cylinder head are made of 17S-T aluminum alloy, the latter being attached to the cylinder with six screws. The main crankshaft bearing is made of 17S-T aluminum alloy. The timer has enclosed breaker points. Designed for either radial or beam mounting, this engine is of the three-port type.

An addition to the Class A model engine offerings is the *Cobey-Waite*, which has a displacement of 147 cu. in., is rated at 1/10 hp at 8500 rpm, and is stated to weigh 3-1/2 oz. The cylinder bore is .562 in. and stroke .593 in. A compression ratio of 4.50 to 1 is used. The steel cylinder is finished by honing and a piston of the same material is ground to a finish. Aluminum alloy is used for the cylinder head, connecting rod and crankcase, the latter being die cast. It is recommended that No. 30 oil be used for this engine, which operates on standard automobile gasoline and is designed for either beam or radial mounting.

Built in Connecticut, the Stenmoor *Bobcat* is a new .42 cu. in. die cast aluminum engine with steel cylinder liner and connecting rod, cast iron piston, and all bearings bronze-bushed. It weighs 7-1/2 oz., has a compression ratio of 8 to 1, and turns an 11 in. diameter, 8 in. pitch prop 10,000 rpm. The rotary valve is of the rear shaft type.

Another two-cylinder engine now offered is the *Viking* 65.2. Rated at 1/2 hp at 8500 rpm, this engine is of the very short-stroke type, the bore of .812 in. and stroke of .625 in. giving a stroke-bore ratio of .77 to 1. The die cast cylinder is provided with a steel liner and steel piston. Bare engine weight is given as 11 oz.

The specifications of the K. & B. *Torpedo*, produced by K. & B. Manufacturing Co., and the *Torpedo Special*, made by Miniature Motors Inc., are included in the accompanying tables. The former was listed in my previous article under "Torpedo," but the engine has since been redesigned.

With a bore of .711 in. and a stroke of .750 in., the *Torpedo Special* has a .298 cu. in. displacement. The honed alloy cylinder has double exhaust ports and the piston is Meehanite iron. The crankcase and connecting rod are aluminum alloy die castings and the latter is provided with a bronze bushing at the lower end. Provision of a bronze wrist-pin makes an upper rod bushing unnecessary. It is a rotary valve engine and weighs 7 oz.

Revised specifications of the *Bullet*, another engine made by the manufacturer of the *Torpedo Special*, also are shown in the tables. Including the new *Vivell* 35 already discussed, the specifications of three engines shown in my last article thus are presented in revised form.

Aluminum alloy die castings, a hardened and ground steel piston, and a honed cylinder are features of the Class B Pierce engine, which is rated at 1/5 hp. The crankshaft is machined from a solid steel bar, hardened and ground. This engine has a .297 cu. in. displacement and is equipped with a rotary valve.

Specifications of the *Arden* .199 engine, which are similar to those of the 099 model described in my last article, except for the cylinder dimensions, are included in the tables.

Design features of the new *Orwick* Class C rotary valve engine have been

revealed. With a weight of only 12 oz., this engine is stated to develop .754 hp. The cylinder and piston are machined from alloy steel, and the cylinder head and connecting rod from 24S-T aluminum alloy. The crankcase is an aluminum alloy sand casting. A Meehanite iron bearing supports the alloy steel crankshaft. The engine is designed for radial mounting, but extra lugs may be obtained for beam mounting.

In response to a request for further information regarding the *Forster 29* and the horsepower tests of this engine described in my last article, the following reply has been received from Forster Brothers:

"Our repeated tests of the improved ball bearing Model 29 engine were made on a reaction dynamometer, using various sizes of props having various pitches. This gave us any number of desired points for our graph. We still have the original test engine in our shop and, if need be, can make the tests again to prove the accuracy of the curves submitted. We have found from past experience that power tests made on a reaction dynamometer and using propellers for a load are far more accurate in the case of miniature engines than when using a flywheel and prony brake. This is mainly due to the fact that the engine will steady down and pull a propeller load at an even speed at which the torque can be measured, while in the case of a flywheel and prony brake it is difficult to maintain an even speed long enough to get an accurate reading. At the time of the printing of our circulars before the war, the bare weight of the Model 29 engine without sparkplug and gas tank was just a little over 5-3/4 oz. Later we strengthened the castings here and there, which added a little more weight. The bare weight of the improved 29 engine with ballbearing crankshaft is approximately 6½ oz."

Pole Cat

(*Continued from page* 34)

of maximum wing chord.

The aluminum cowl is made to fit over formers A, B and C. It can be held on with silk hinges to the top stringer. Add a small catch to the lower end to hook to the crutch.

The whole ship is now ready for covering. Go over the surface with very fine sandpaper in order to get a smooth covering job. After several coats of clear dope are added, apply the color.

The prop was carved from a 3/4" square block and only one blade used. This was balanced inside the spinner and worked excellently. The spinner is cemented in place and faired into the prop.

Test-flying this ship is much the same as any other; fly slowly at first. Launch with the ship held in the right hand and with the line pulled taut overhead, banking the ship away from the pole and gently launching downwind. Be sure to offset the engine at least 2° opposite the turn. Power should be added slowly—however, don't increase power if the ship starts to climb; instead move the weights forward until balance is perfect and then add power. In this manner you can get the ship to fly straight and level with maximum power.

When the motor cuts, the ship will spiral down until it is within reach and traveling slowly—then it is an easy matter to grab it. Even if allowed to swing around until the ship drops against the pole (the line should be cut so the model cannot reach the ground) no harm will be done.

Airways

(*Continued from page 31*)

sponsored by the American Legion, and details will be worked out in conjunction with the Institute of Air Age Activities and the Academy of Model Aeronautics.

Eliminations will be held in all 48 states and the District of Columbia; and if it seems advisable, regional contests will be held in 11 regions between the last of the State meets and the Nationals.

While the Legion holds the option on all these preliminary meets, it will be glad to hear from other interested groups who may wish to sponsor some of the meets. However, when this appears in print, all the meets will undoubtedly be definitely scheduled. Watch these pages for dates and locations.

Super Buccaneer is silk covered and is powered with a *Baby Cyclone* engine. It is now being trimmed up for 1947 competition work, has lifting tail and redesigned rudder and stabilizer. It is attractively finished with gold wings and tail unit with red tips and centersection trimmed with black. The fuselage is black with red cowling and fuselage flash.

John E. Cleland, Matthews 2, Harvard University, Cambridge, Mass. sent in No. 6 of his World War I SE5. He redesigned this biplane from Megow plans and powered it with an *Atom*. It has only a 24" wingspread and consequently provided John with several interesting flights. Although the fifth flight proved

Walt Schroeder (right), staunch supporter of radio program "Meet the Model Builder," shown with Jack Bayha, originator of the feature, during recent broadcast.

* *

Picture No. 1 shows the first model which Alan S. Reed, 3261 Tullamore Road, Cleveland Heights 13, Ohio has built since returning from Japan. It is a speed rubber job. He is now working on a twin-fuselage rubber model which is also an original design.

J. C. "Madman" Yates, 942 N. Catalina, Burbank, Calif. sends in the excellent photograph No. 2 of his Lockheed *Sirius* taken by Art Moser. This scale model, powered by an *Orwick* engine, flies at 85 mph and weighs 4-1/2 lbs. He thinks that what makes this low wing airplane so stable in flight is the fact that the coil, batteries, switches and booster plug are all in the wing, thus bringing the C.G. pretty low. This model has won one 1st and three 2d place trophies in contests up to the time of writing.

No. 3 shows Victor G. Mathern's Waco cabin U-Control ship. Victor, of 7415 Roseberry Ave., Harrington Park, Calif. writes that he has been subscribing to MODEL AIRPLANE NEWS since 1932, but gives no details of his model.

Rigo Lindgren, Pensionatet, Ottenby, Sweden, sent No. 4 of his Fokker D8 which was built from M.A.N. plans and powered with an *Eisfeld B 1* 1/8 hp engine of German make. Victor tried out an "autopilot" of his own design on this model, and it worked so well that he now uses it on one of his speed models. He recommends the Fokker D8 for beginners.

No. 5 shows R. F. Fowler's pre-war model of his *Super Buccaneer*. Mr. Fowler, of 21 Somerford Grove, Park Lane, Tottenham, London N. 17, England, is an RAF veteran who read M.A.N. while he was stationed in South East Asia. His

to be the last, this model performed all kinds of aerobatics from a loop to a roll and a spiral dive. It weighed 12 oz., but the increased ruggedness gained proved well worth the extra weight.

Franco Bucio Ciprés, Huasteca No. 178 Col. Industrial, Mexico, D.F., sent No. 7 of his biplane which he built for U-Control. Unfortunately he gave no details on this ship.

No. 8 is a Class B indoor cabin ship built by Pete Andrews, 8602 63rd Drive, Forest Hills, L.I., N.Y., which won the AMA "B" record with the time of 17 m. 40.6 secs. at Kingsbridge Armory last fall.

No. 9 illustrates the all-time favorite model of Ray Daniel, Route 3, Belton, Tex. It is of original design and is powered by an *Ohlsson* 19. Wingspan is 30", and all solid construction gives it a weight of 26 oz. The highest speed Ray has been able to get is 66.44. The engine cowling is removable and batteries are inserted from rear of pod. The airscoop is an actual working supercharger. He writes that this is the most stable and easiest flying ship he has ever used.

John Mosca, 437 Rosehill Place, Elizabeth, N.J. sent in No. 10 of his diesel engine. It has a .199 cu. in. piston displacement and will swing a 10" prop with an 8" pitch at 4000 rpm. A dome piston is an original feature. John, who is a tool and die maker, writes that his 22 years of model building proved an invaluable asset in teaching him to read prints and drawings in his trade.

D. F. Galasneau, Portland, Oregon, submits No. 11 of his *Rearwin Speedster*, which was built from plans in May 1940 issue of M.A.N. Construction was started just after his release from service and

took the better part of two months. He is hoping for good flying weather so that he can try it out.

No. 12 is an excellent illustration of the ability, both as model builder and photographer, of Warren R. Watson, 308 E. Bonita Avenue, Baldwin Park, Calif. He assures us that this B25 really flies. It is powered by two inverted *Ohlsson* 23's, is all planked with balsa, and has a 55" wing with flaps that work with the aid of a third line. The cockpit and gun turrets are fully detailed. The high glossy finish which can be noted in the photograph took a month to complete.

NEWS OF MODELERS

René Tuthill, 105 Kent Street Salishan, Tacoma 5, Wash. would like to correspond with modelers interested in new designs, preferably originals. He would like to trade supplies with modelers in foreign countries where they are scarce.

Jimmy Ferguson, 2533 Daisy Lane, Fort Worth 11, Texas is anxious to start correspondence with fellow modelers, particularly those interested in U-control sailplanes and free flight.

Sven Eriksson, a 16 year old Swedish modeler, asks MODEL AIRPLANE NEWS to help him find an American model builder with whom he can correspond. Readers can contact him at Langgalan 73, Sundsvall, Sweden.

Maurice W. Wilkinson, 21 Garturk Street, Glasgow S.2, Scotland—D. J. Foreman, 8 Alloa Road, Goodmayes, Essex, England—and M. Starling, 67 Howberry Road, Thornton Heath, Surrey, England would like to exchange their current issues of *Aeromodeller* for current issues of MODEL AIRPLANE NEWS each month.

F. Gardner, 31 South Terrace, Sowood Avenue, Ossett, Yorkshire, England also makes the above request. And he would like to hear from Mr. H. Arnold, National City, Calif.

Peter V. Letts, an 18 year old RAF member, is another English modeler who desires to correspond with an American modeler. He writes that his interests are gliders and indoor and outdoor rubber models. He can be reached at: 108 Sandwell Road, Handsworth, Birmingham 21, Warwickshire, England.

David Valleley, 20 Mayfair Road, Crossacres, Wythenshawe, Manchester, England is anxious to resume activity as an aeromodeller after six years of service in the British Army. He has 120 copies of the British aeronautical journals, *Flight* and *Aeroplane*, dated from October 1945, and he states they are in good condition and contain fully detailed drawings of all the latest postwar British civil planes, military types, and jet and piston type engines. He would like to exchange these journals for copies of M.A.N. or other aero magazines dating from February 1940 to the present.

Cesar Aguiar Gama, Rua Xavier Da Silveira 45, Apt. 56, Copacabana, Rio de Janeiro, Brazil would like to correspond with other modelers.

CLUB NEWS

California

Francis Stewart, Secretary, reports that the *Bakersfield Gas Model Airplane Assoc.* will hold its annual free flight contest on April 13, co-sponsored by Bakersfield Junior Chamber of Commerce. There will be $500 in cash prizes along with trophies. The local merchants do their share in donating several hundred dollars in merchandise prizes every year. The contest will be held at Minter Field which has several thousand acres of very level hard

surface and, if the sun is shining, is thick with thermals. Last year 14 models were lost in thermals (not counting the ones that spun in on the asphalt runways). Club members found and returned all of these models within one week. The B.G. M.A.A. holds the all-time record on the coast for contestants for a single meet with 504 entries in 1940.

RAY ACORD reports the results of *Los Angeles Aero Modeler's* 21st Semi Annual Contest held on December 15, 1946.

Class A—1. Stuart Sittig. 2. Dennis Davis. 3. James L. Squire.
Class B—1. Robert F. O'Brien. 2. Ray Acord. 3. Jim Saftig.
Class C—1. Dan Lutz. 2. Frank Davis. 3. James Thompson.
Sweepstakes—Robert O'Brien.
Longest Flight—Jim Saftig.
Junior Trophy—Howard Bell.
Ladies Trophy—Doris Mitchell.

THE San Francisco Recreation Department announced the results of their hand-launched glider contest on December 20th in their bulletin, *The Third Dimension.*

Junior Division

Junior Glider—1. Larry Giordanengo and Ronald Jackson. 2. Aurella Doerner. 3. Orel Pierson.
Micro Glider—1. Larry Giordanengo. 2. Aurella Doerner. 3. Frank Jordan.

Micro Division

Junior Glider—1. Frank Pagano. 2. Jack Ritner. 3. Ronald Shewbridge.
Micro Glider—1. Ronald Shewbridge. 2. Al Ireton. 3. Paul Baker.

Class B Towline

Junior Division—1. Doug Smith. 2. Paul Forrette. 3. Noel de Nevers.
Micro Division—1. Frank Pagano. 2. Ronald Shewbridge. 3. Jack Ritner.

THE *Northern California Model News* reports that Bob Dollar received the coveted Sky Bug trophy at Santa Rosa with close competition from L. S. Cook, Al Fredrickson and Blair Mitchell.

These new officers were installed at a special meeting of *E.M.E.S.*: Pres., Jack Collier; Gen. Mgr., Walter Brown; Chief Clerk, R. C. Cushing; "O" Supt., Clifford D. Grant; "HO" Supt., Dr. Edward L. Scudder; Stock Clerk, Maurice Maede; Chief Electrician, Russell Ahrnke; Director of Public Relations, James L. Munson; Editor, Philip C. Johnson.

Listed below is the 1947 contest calendar taken from *Northern California Model News.*

April 13—Free Flight—Bakersfield
April 27—Free Flight—San Diego
May 4—U-control—Los Angeles
May 11—Free Flight—San Bernardino
May 25—Free Flight—Fresno
June 8—Free Flight—Los Angeles
June 22—Free Flight—Oakland
June—U-control—Alameda
August—U-control—Palo Alto
Sept. 28—Free Flight—Oakland
Oct. 12—U-control—Los Angeles
Oct. 19—U-control—Albany
Dec. 7—Free Flight—Los Angeles

RESULTS of the Class "C" Catapult Glider challenge contest held at Livermore Airport by the *Oakland Cloud Dusters* are as follows:

1. Andrade, Blau and M. Demos. 2. Pop Robbers. 3. Pete Demos.

Results of the indoor hand launched glider challenge contest held in the Oakland Armory are:

1. Gordie Peterson. 2. Bob Blau. 3. Mike Demos.

F.G.M.A.C. reports the following results for their monthly contest held on November 24, 1946.

Class A—1. Roland Mosier. 2. Dick Beggs. 3. Jack Tiftick.
Class B—1. Al Bissonette. 2. H. Vincent. 3. M. Martin.
Class C—1. Ralph Mower. 2. M. Martin. 3. Rae Farrar.
Juniors—1. H. Vincent. 2. R. Mosier. 3. R. Balekian.

Results for their U-control contest on December 8, 1946 are:

(*Turn to page 64*)

Introducing THE MACVAL

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- NO BATTERIES . . . save 2 oz.
- NO LEAD . . . . save 1/4 oz.

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Now it can be sold! Only after exhaustive tests, improvements in design, more tests, more improvements, until our designers and engineers were positive to the last infinitesimal detail that here was the finest motor that could be produced, were we willing to present the MITE to you. It's the first Diesel to have a positive engine cut off for free flight (adjustable to throttle down slowly for the last two seconds of power run, eliminating the critical dip and adding seconds and even minutes to flight time). First Diesel that can be throttled efficiently for free flight testing purposes (runs steadily at throttled-down rate of 1500 RPM). The MITE is so completely engineered that the fuel line is actually a metering valve for more efficient carburetion. We can say it with confidence — it's a great motor for a great gang of modelers! Get the MITE at your dealers for a new thrill in flying!

WHAT A SWEET PERFORMER!

- Best time 51 M.P.H. in control line.
- Best endurance time 12 min. on 18 sec. run.
- Power output 9000 RPM (8" dia. 8" pitch prop*)
  *ON COMPARISON TESTS
  MITE 9000 RPM
  ENGINE "A"—4800—5000 RPM
  ENGINE "D"—3500—3700 RPM
- Fixed compression 13 1/2 to one.

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- Displacement .099
- Weight including tank 2 6/10 oz.
- Overall height 2 3/8 inches
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Class A-B Speed—1. Francis Marshall. 2. Gene Webster. 3. Billy Price.
Class C Speed—1. Ronnie Silva. 2. Doug Roberts. 3. Vester Warner.
Precision—1. Jim Phillips. 2. Gene Webster.

They also announce election of the following new officers: Pres., Richard Beggs; Vice Pres., Henry Vincent; Recording Sec., Jack Tiftick; Financial Sec., Red James; Contest Director, Ralph Mower.

BRUCE PICKETT announces the formation of a new club, *Pomona Valley Model Airplane Assoc.*, whose officers are: Pres., Dean Landreth; Sec., Eugene Wood; Treas., Don Jones. This up and coming new club held a free flight meet in December with first place going to Orville Long. They also report a meet with a Glendora club in December in which Pomona took first place for rubber stick, towline glider, and free flight gas.

THE *San Francisco Model Aero Club* elected the following new officers: Pres., Bud Craighead; Vice Pres., Bill Binns; Treas., Wm. Mackerracher; Sec., J. Newhall.

NEW MEMBERS are welcome in the *East Bay Aeroneers Assoc.* Any model builder living in the East Bay area may attend only three meetings, then must apply for membership. Meetings are held every Monday at 8:00 p.m. at Roots Hobby Hut, 6036 Telegraph Avenue, Oakland.

THE *Aeroneer* reported results of the E.B.A.A. monthly contest held on December 8th:

Class B—1. J. Volponi. 2. Jim Liebee. 3. Bill Steese.
Class C—1. Russ Watkins.

Listed below are the final E.B.A.A. point standings for 1946.

Class A—1. Jack Dyer. 2. Jim Liebee. 3. D. Verba.
Class B—1. Bill Steese. 2. Jim Liebee. 3. Don Foote.
Class C—1. C. Hubbard. 2. R. Watkins. 3. C. Doane.
Junior—Stan Stufflebeam.

THE *Golden Gators Model Aero Club* elected these new officers: Pres., Paul Tull; Vice Pres., James Heims; Sec., Don Bedell; Treas., Howie McDonough.

W. S. BISCAY of *Albany Control Flyers* writes that his club and the *Tethered Terrors* of Berkeley met with Richard E. Walpole, Manager of Regional Parks, to discuss establishing of a permanent Model Flying Field in Tilden Park. Mr. Walpole suggested an area adjacent to the Cricket Field which was agreed upon as being suitable, and plans are being made to grade this area to make three flying circles which will be ready about the first of March.

This Model Flying Field will be available to all model flyers who meet the safety rules of the sport and will be the center of model activities in the East Bay Area. At some future time a Model Race Car track and a Model Boat Pond will be added to make a complete Model Center.

THE *Penninsula Prop Twisters* put over a fine U-Control Contest on January 12th at San Mateo with the following results:

Class A—1. W. S. Biscay. 2. Mel Anderson. 3. Royce Van Bebber.
Class B—1. Bill Thumber. 2. Roy Mayes. 3. Gillespie.
Class C—1. J. Swenson. 2. J. Pedracci. 3. W. Dunkum.
Crash—Snuffy Duffy.
Appearance—H. Smith.
Team—1. R. Heise and J. Swenson. 2. Don Vi, Ted Wilson, and Ed Bowley. 3. Bob White, Royce Van Bebber, and Howard Puckett.

Yearly point standings (1946) are:

Class A—1. H. Vincent. 2. F. Mosier. 3. R. Beggs.
Class B—1. M. Martin. 2. R. Balekian. 3. H. Vincent.
Class C—1. R. Mower. 2. M. Martin. 3. R. Farrar.
Juniors—1. H. Vincent. 2. R. Balekian. 3. F. Mosier.

(*Turn to page 66*)

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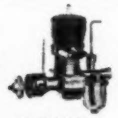
Arden .099	(Class A)	$18.50*
Arden .199	(Class A)	23.50*
Marvin	(Class A)	15.50*
Bantam A	(Class A)	18.50*
Bullet	(Class B)	12.75
Ohlsson 23	(Class B)	16.50
Cannon 300	(Class B)	19.75*
DeLong 30	(Class B)	19.50*
Forster 29	(Class B)	24.75*
Hurricane	(Class B)	19.75*
Melcraft	(Class B)	18.50*
Merlin	(Class B)	18.00*
Rogers 29	(Class B)	15.75*
Hornet	(Class C)	35.00*
Cannon 358	(Class C)	21.50*
Dennymite	(Class C)	15.85
Ohlsson 60	(Class C)	18.50
OK Super 60	(Class C)	21.00*
Rocket	(Class C)	22.50*
Vivell 35	(Class C)	18.00
McCoy	(Class C)	35.00*
Pacemaker	(Class C)	24.95*
Mite Diesel	(Class A)	18.50
Drone Diesel	(Class B)	21.00
Movo Diesel	(Class A)	21.50

OHLSSON '23' $16.50



BANTAM A $18.50

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Stanzel Interceptor (A-B)	2.95
Skyrocket Super A	2.95
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Playboy Jr. (B)	2.50
Varsity (B)	3.50
Brooklyn Dodger (B-C)	3.95
Comet Zipper (B-C)	5.95
Airfoiler (B-C)	3.95
Master Crusader (B-C)	7.50
Shulman Zoomer (B-C)	6.95
Bay Ridge Pacer (C)	4.95
Buccaneer C	6.95
Mercury (C)	5.50
Playboy Sr. (C)	4.50
Comet Sailplane (C)	8.95
Capitol Flamingo (C)	9.95
Super-Sunduster (C)	8.95
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Illinois

The *T. M. Stoner Model Club* of Aurora invites all modelers in the Fox River valley to join their club. Contact Hart G. Betts, 7 Fox Promenade, Aurora for full details.

Kansas

The *Mid States Model Aeronautical Assoc.* reports election of officers for 1947: Pres., C. O. Wright; Vice Pres., O. L. Elbring; Sec.-Treas., Al. J. Hummel.

Dope Fumes, official monthly publication of *Wichita's East Side YMCA Hy-Flyer Clubs* and *Mid States Model Aeronautical Assoc.* announce the formation of a new club called *Newton Hy-Flyers* at Newton. J. J. Kroeker, Pres. of the new group, acted as Contest Director for their first meet, an indoor affair at Lindley Hall. The club meets in the "Y" Building at Newton on Wednesday at 7:30 p.m.

The following were elected by *Boys' Farm Hy-Flyers:* Pres., Benny Aeby; Vice Pres., Bob McCoy; Sec., Harold Krause; Reporter, Harold King.

THE *Men's Eagle Hy-Flyers Club* reelected their officers at a semi-annual election: Pres., Bill Bain; Vice Pres., Frank Manley; Sec.-Treas., Jay Osborne; Sponsor, E. Linn.

Louisiana

The *Shreveport Modeleers Club* will sponsor a spring contest to be held April 13th (Alternate date April 20th) in Shreveport. It will be the "South-Central Regional Control Line Contest." They hope to have prize awards of approximately $800 in value. The last contest held on September 8, sponsored by Shreveport Kiwanis Club, attracted 65 contestants. The *Shreveport Modeleers Club* has now installed its new officers who are: Pres., Sgt. Robert V. Mann; Vice Pres., Robert Earl DeLoach; and Sec.-Treas., Tom Philyaw.

Massachusetts

The *Boston Speed Demons* formed a new club with the following officers: Pres., William Creighton; Sec., Earl Richards; Advisor, Al Green; Contest Director, Esio Grassi. Meetings are held at 24 W. Tremlett St., Worchester, on Thursdays at 7:30 p.m. New members are welcome. Prizes are awarded every three months on a point total basis. Inter-club contests are held every two weeks at the Franklin Park Golf Course.

ANOTHER NEW Massachusetts club is the *Blackstone Valley Gas Modelers*. Officers elected are: Pres., Al Jemlick; Vice Pres., Jerry Baghdasanian; Sec.-Treas., John Curran, and Club Photographer, Philip Dion. Flying sessions, both free flight and control line, are held at Uxbridge Fair Grounds every Sunday, weather permitting. Meetings are held bi-monthly at the Boy Scout Headquarters.

Michigan

Harvey C. Varnum, Secretary, reports the formation of a new club, *Ann Arbor Airfoilers*, which has a monthly paper known as *Airfoiler's News*.

New Jersey

The *N.Y. Society of Model Engineers*, Lackawanna Terminal, Hoboken, announces that a space fifty feet square is being set aside for inclusion of a model race track for testing and racing miniature power boats, planes and racing cars in the upper concourse. Constructed with a water-tight rubber basin as a base and a removable platform to cover the "half-doughnut" shaped water course, the race track provides a circular path some 35 ft.

in diameter for boats and cars. Through an ingenious arrangement of a centerpole, wires and pulleys, airplane "sputterbugs" may sit outside the track area in an airplane cockpit and control their planes using the wood platform as a landing field.

THE *Exchange Club of Elizabeth* held their Model Airplane Flying Carnival at Elastic Stop Nut Field, Union, on January 8th, with the following results:

Class C Speed—1. Ernest Babcock, Jr. 2. William Toohey. 3. Henry P. Laureys.
Class B Speed—1. Francis McElwee. 2. Peter Schonenberg. 3. Robert Schwanhausser.
Class A Speed—1. Thomas F. Osiecki. 2. Ernest Babcock, Jr. 3. Matty Kania.
Stunt Event—1. Ernest Babcock, Jr. 2. Don McGovern. 3. Johnny Diehl.
Jet Speed—1. Dick Mahoney. 2. James Fitzpatrick. 3. John Wardlow.
Scale Model Flying—1. Artie Hasselbach. 2. Francis McElwee. 3. Ernest Barth.

High point winner of the meet was Ernest Babcock, Jr. who won a Cushman Motor Scooter. The snow was plowed from the field by three members of the *Linden Model Club*.

New York

William Fletcher, Secretary, reports that *Prop Spinners Club*, Elmhurst, is now formulating plans for its Eighth Annual Northeastern Championships Model Airplane Contest. The date is to be August 3; the site, the familiar east coast modelers' heaven, Hicksville Flying Field, Hicksville, L.I. Events are: separate Classes A, B and C free flight gas and a combined class towline event. Prizes valued at $500 to $800 will be awarded to at least 15 entries in each event. The Northeastern Championships Perpetual Trophy again will be awarded to the contestant amassing the highest number of points in each of the four events.

THE *Syracuse Model Airplane Club* started its 14th year under Exchange Club sponsorship with the following elected officers: Pres., Denny deLaroche; Vice Pres., Ed Izzo; Sec., Herb Sennert; Treas., Andy Nicholas. Meetings are held at the First Presbyterian Church, 620 W. Genesee St. each Friday at 7:30 p.m. Prospective members are urged to come to a meeting and get acquainted.

SINCE THE postwar Constitution has been drawn up and voted on, the *New York Aeronuts* is making a drive for added membership. Those interested (active flyers only) are requested to write to Bernard Schoenfeld, 11 Cornelia St., New York, N.Y.

North Carolina

Don T. Howell, Corresponding Secretary, writes that the *Piedmont Modelaires* of Concord and Charlotte, held their 1947 election on January 8th with the following results: Pres., R. L. Deal; Vice Pres., Jimmy Kilgore; Sec.-Treas., John Hopkins; Corresponding Sec., Don T. Howell; Publicity Mgr., H. Lester Ritchie, Jr.; and Sgt. at Arms, John Ritchie. Plans were started for the 2nd Annual Dixie Championship Contest for free flight, and a tentative date was set as August 31. The Dixie contest will be open to any contestant who can get there.

Sherman M. Spector of Havelock has written for information on starting a gas modelers club. Interested modelers in his area should contact him.

Oklahoma

Mrs. Nadine Hay, Sec.-Treas., reports the formation of a new club, the *Propfellows*, with the election of officers as follows: Pres., Hank Hay; First Vice Pres., Don Clingan; Second Vice Pres., Jake King; Sergeant-at-arms, Jake King; and Sec.-Treas., Nadine Hay. This new club is

anxious to exchange ideas with other clubs. Mrs. Hay's address is 2336 S.W. 31st St., Oklahoma City.

Washington

The *Tacoma Aeromudlers* report the election of new officers for the Jan. 1-June 30 term as follows: Pres., Jerry Thomas; Vice Pres., Fred Doty; Sec., Frank "Curly" Hansen; Treas., Vic Lichenberg.

"Curly" Hansen reports the results of the monthly club contest which was held at Harts Lake Prairie on December 29:

1. Don Sangesand. 2. Bob Ormsby. 3. Byron Blanchfield.

Wisconsin

Wally Strittmater, 1530 Jackson St., LaCrosse, requests that all Wisconsin model builders send their names and addresses to him so that he may send them full information on the new state association. The first major objective of this association is the forthcoming National Elimination Meet for the Wisconsin area.

England

Roy Gunn, of *West Coventry M.A.C.* reports through *ABA News* that the popularity of their indoor season is evidenced by the large number of members attending and the number of models being flown. A competition was held last October 23 and the winner was A. J. Barr, with aggregate times of 279.3 secs.; Mr. Dudley, of the Kenilworth Branch, was runner-up with an aggregate of 129.8 secs.

Palestine

The Editor of MODEL AIRPLANE NEWS received an invitation to a Sailplane and Model Airplane Exhibition sponsored by *The Jewish Aero Circle* at the Dov-Hoze House, 22 Bezalel St., Tel Aviv, on December 22, 1946.

South Africa

Lieut. W. R. Kotze, 84 Smit St., Silverton, Pretoria, Transvaal, South Africa, writes that there are a good many clubs in the Union which usually hold contests once a month with a meet every Sunday. Arrangements are being made to hold their first Nationals since 1938 sometime during April, with Bill rooting for the *Carwill* team.

R. D. Masters, 44 Oakhill Road, Berea, East London, South Africa, a former B24 pilot, writes as Chairman of the *East London Model Aeroplane Club* that sailplanes are extremely popular with them, having produced their best flights. One *Thermic "70"* turned in 39 min. 25 sec. at one meet, and 15 min. at the next. Gas models are plentiful; rubber models have not been spectacular due to the shortage of good rubber.

Finish First

(*Continued from page 21*)

owes its beautiful finish to 25 to 30 coats of various types of dope, with 8 to 12 separate sanding operations. Even the Cub, where lightness and economy of production rather than beauty are of first importance, probably has a 9 coat finish. So don't try to shortcut the finish of your scale model.

It is not possible to state the number of coats of dope any particular fabric covered scale model will require; this depends on the material used in covering, the care used in the doping, and the pigmented dope used for the final color. It is fairly certain that 8 to 14 coats of

(*Turn to page 71*)

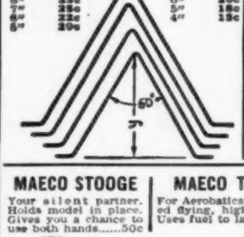
Airco Presents

New Devices to make your model building more enjoyable. More ideas on the way.

AIRCO "V" LANDING GEAR

"V" design best for maximum shock absorption. Low cost. Much trouble saved.

1/8 Wire Y	Price	3/32 Wire Y	Price
8"	25c	6"	20c
7"	25c	5"	18c
6"	22c	4"	15c
5"	20c		



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Cut especially for us. Extra thick hubs for strength and airfoil shaping. P/D Ratio 1.3 provides large blade area. Shaft hole drilled.

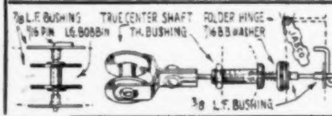
PRICE	
10"	12c
12"	14c
14"	18c
15"	24c
16"	26c

T-56 BROWN RUBBER

Identical to pre-war. Made by U.S. Rubber Co. At prices you can afford. Small sizes promised late in Feb.

1/4 .... 10'-20c
1/8 .... 10'-10c
1/16 .... 15'-10c
3/16 .... 10'-15c
3/132 .... 12"-12c
1/32 .... 25'-10c

JASCO LUBE
1 oz. 17c



J-Bolt FOR 3/32 or 1/8 WIRE ~ 4 FOR 25¢

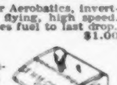
3 J-Bolts 18c when ordered with AIRCO landing gear. Mention size of wire.

MAECO STOOGE

Your silent partner. Holds model in place. Gives you a chance to use both hands...... 50c

MAECO TANK

For Aerobatics, inverted flying, high speed. Uses fuel to last drop. $1.00



With AIRCO prop shaft assembly, building rubber models will be fun.

T-CENTER SHAFT with 2 Bush. 35c

B.B. WASHERS 7/16" or 5/16" .. 10c

L.F. BUSHING 7/8" .... 3-5c 3/8" 1c

FOLDER HINGES Single Set 10c

THREAD BUSHINGS Note cut-in for spring. With spring 15c

TENSION SPRING Standard 2" 5c

BOBBINS 24 or 36 strands 5c

FLAT WASHERS 1/16 wire .... 4c doz.

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GUARANTEED TO PLAY for you if attached and used according to complete instructions sent with each radio. You can use it at home, in offices, hotels, cabins, in bed, etc. Lots of fun—and real entertainment!

SEND ONLY $1.00 (cash, money order, check) and pay postman $2.99 plus delivery fees on arrival or send $3.99 for postpaid delivery. Complete as shown **ready to play** with self contained personal phone. **For Gifts—children will love it—grownups too! An exceptional value—order yours and enjoy the many good radio programs coming! Don't be without your Pakette Radio another day!** (All foreign orders $5.00 U.S. cash.)

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- All Balsa construction.
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Winning Ticket!

1st PRIZE DAILY MIRROR
1st PRIZE PHILA. RECORD

$9.95 Less Motor. By Mail add 50c.

Winner of Controline Scale Model Division. Wingspan 40", Alum. cowl, decals, die-cut plywood, rubber wheels, formed landing gear, de luxe extras. For Class "B" or "C".

OTHER DISTINGUISHED MODELS

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Navion ("U" Scale) $7.50
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GREATER EFFICIENCY, MORE POWER!

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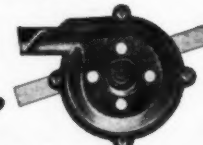

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BALSA WOOD 18"
1/16x1/16 60, 5c
1/16x1/8 .... 30 5c
1/16x1/4 .... 16 5c
3/32x3/32 20 5c
1/8x1/8 ...... 15 5c
1/8x1/4 ...... 8, 5c
3/16x3/16 6, 5c
1/4x1/4 ...... 5, 5c
1/2x1/2 ...... 2, 7c

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1/32x2 6, 10c
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36" double 18" price.

BLOCKS 18"
1/2x2 10c; 1x1 10c
1 1/2 x1 .... 18c
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Gas Tissue 24x36 White only 2 for 5c
AA All col. 18c dz.
Bamboo red, white, blue, yellow 6c ea.

WIRE
6-8-10 .... 1c ft.
12 & 14..2 ft. 3c
1/16 dia. 3 ft. 10c
3/32 ...... 3 ft. 15c
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PROP SHAFTS REAR HOOKS
12 for 15c

CELLULOID
Sheet 5x7..ea. 5c

ISIGNIA
24 and stripes 5c

THRUST BEARINGS, dz.
Sm. 10c; lge. 15c

IGN. WIRE
(Hi tens.) .... ft. 5c
Hookup wire ft. 3c

PURSUIT GUNS
3/4 or 1 1/4 ea. 5c
Bombs 3/4 ea. 5c
Bombs 1" 10c
Bombs 3" 20c
Lewis gun 1 1/4" 10c; 2" 12c

NOSE PLUGS
1/2" .... 6 for 5c
1" .... 2 for 5c

WHEELS, per Pr.

	Balsa	Brch	Celu
1/2"	.03	.02	
3/4	.04	.03	
1	.05	.04	.10
1 3/8	.08	.05	.15
1 7/8	.10	.07	.20
3	.15	.15	.30

Camouflage Set. 12 Bottles .$1.00
Austin Timer 1.50
Hillcrest " 1.25
Model Knife 10c
2 extra blades 10c
Spark Plugs 50c
U. S. Coil 1.50
Rubber Lube .. 10c
Rub. tubing 1' .. 5c
Sup. AeroCoil 2.50
1" Pins 50 5c
Battery Boxes 40c
Sandpaper pkg. 5c

Sponge Rubber Wheels
2" 40c; 2 1/2" 50c
3/4" 20c; 1" 30c

DOWELS
1/16x6 .... 5c doz.
1/8x18 .... 2 for 5c

CONDENSERS
Metal 35c
Paper 15c

CEMENT THINNERS CLEAR DOPE
1 oz. 5c
Large bot. 8c
1/2 pt. 40c
DOPE ALL COLORS 6c; 10c; 40c
Aluminum 10c

12" BAMBOO
1/16x1/4 3 for 5c
1/32 .... 36 for 5c

PLASTIC BALSA
Large can 15c

BRUSHES
Small 5c; Lg. 10c
Washers, Doz— 1/8 .... 2c; 1/4 .... 5c
Free Wheeling 10c
Ball Bearing .. 10c
Bushings .. 5c doz.
Large ...... 10c doz.
Prop Hinge 15c

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10 for $1.00

RUBBER
1/16" .... 10 ft. 5c
1/8" flat ...... 1c ft.
Neoprene tubing .. 25c ft.

PROPELLERS
Balsa 5 to 12" 1c per inch.
Gas 9 to 14" 50c ea.

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dope are necessary to obtain maximum lustre of finish on silk. It is this fact that model fans should bear in mind from the first, for the greatest strain that will be imposed arises from shrinkage of the covering. One unfortunate aspect of this situation is that the very parts which, on full sized aircraft, are stressed to carry only incidental loads, must on the model be under the greatest strain.

The trailing edge of the wings and the fairing strips along the fuselage, for example, are points on the model where maximum strain occurs. These are parts of relatively small dimension. On the average scale model, to hold these parts to scale and at the same time insure adequate strength to carry the strain imposed by 8 to 14 coats of dope, requires special consideration. It cannot be overemphasized that this type of problem *must be worked out while the model is at an early stage of construction* if a finish worthy of the detailed scale model is to be achieved. The model builder should be certain the materials chosen and the type of construction followed will provide a structure sturdy enough to stand the strain imposed in the finishing process. As a suggestion, metal can frequently be used in those parts subjected to the greatest strain. Thin sheet aluminum, copper or brass can usually be worked without special tools or equipment.

If the scale model is built in the same manner as its fullsized prototype—in various units which can be assembled and disassembled—the following advantages will be realized:

1. Each unit (wing panel, fuselage assembly, etc.) can be finished separately.
2. Maintenance of the model's finish is far easier since disassembly permits cleaning or repairing of parts as necessary.
3. Greater fidelity is achieved in duplicating the fullsized structure.

Each of the models illustrated can be disassembled completely in a few minutes, and the advantages gained from this have proven well worth the additional construction time spent in making this possible.

One procedure of fabric work in the aircraft industry that can be adapted to scale model work is the use of pinked tape. On all fabric covered aircraft structures pinked cotton tape in appropriate widths is attached before covering to all edges of the structure against which the fabric would touch. This tape is attached to all ribs, fairing strips, leading and trailing edges, and longerons. The purpose is to strengthen and protect the covering at these edges where strain and wear are greatest. After covering and applying the first coats of dope, a second layer of this tape is doped on over the same edges, thus providing three layers of fabric at the points of greatest strain on the covering. (This is exclusive of the special tape used in the process of sewing the wing cover to the ribs. Since model covering need not be sewn there is no comparable use of this type in scale model work.)

A modification of this technique can advantageously be used on scale models. Silkspan paper cut in strips can be used to duplicate the pinked tape. All model fans who have used silk as a covering material are familiar with its tendency, when doped, to wrap itself around fairing strips and other portions of the model's structure with which it comes in contact. This occurs because model airplane silk is extremely porous and the dope tends to penetrate through to the structure. A Silkspan strip under the silk covering

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effectively stops this tendency. A second advantage occurs when sanding a covered surface. In this operation even the finest sandpaper may cut through the covering at exposed places—over a rib or fairing strip for example. With three layers of covering over these places (a strip of Silkspan, the silk covering, and a second strip of Silkspan) the danger of sanding through the covering is reduced. It is believed that this procedure greatly facilitates the covering and finishing processes.

Although the success in covering scale models depends on the individual's skill and experience in working with silk, it also depends on consideration of the following general rules:

1. The "grain" of the covering material should parallel the longer dimension of the part being covered. (The grain of silk parallels the selvage.)

2. The covering of parts where the curvature is in two directions is best accomplished working with wet silk. (Difficulty is frequently encountered in aircraft fabric work in obtaining this type of fabric curvature. Examples that come to mind are the junction of fin and fuselage on recent model Stinsons and the fabric fillet between centersection and fuselage on certain model Beechcraft biplanes.) Repeated attempts will eventually yield the effect desired in this type of model fabric work.

3. Thick dope or model cement is suitable for adhesive. The covering should be cemented to the structure at intermediary points only where necessary. That is, only where the curve of the structure is concave.

4. Uniform tension of covering on all areas should be obtained in order to equalize the strain on the structure and the tautness of the final surface.

The covering of each unit should be sprayed with water before doping—an atomizer or insect spray gun is suggested. If the covering has been done properly no wrinkles or malformations will remain after shrinkage takes place. If wrinkles remain it is not a safe policy to trust that they will disappear with the application of dope.

There are many advantages to spraying dope rather than brushing it. It is possible, however, to obtain as excellent a final finish by using a brush as with a spray gun; it just takes longer. Sable-hair brushes will be found very satisfactory for models up to about 4 ft. in span.

The doping procedure recommended is similar to that followed in the aircraft industry. Apply one coat of clear dope to all surfaces of the model; then dope the strips of Silkspan over the structure as previously suggested, following with 2 coats of clear dope. The surfaces on the various parts at this point should be taut enough for sanding. This initial sanding can be done with No. 320 Wetordry sandpaper used wet. Sand lightly and avoid as much as possible sanding on top of ribs and similar places. After sanding a wing panel, for example, look along the surface into a strong light. A multitude of small bright spots will probably be noted at this early stage. These are miniature pits in the finish which it is necessary to fill; eventually they can all be removed from the finish.

Follow the initial sanding with 2 more coats of clear dope. Unless the finish is unusually rough it is suggested that sanding be done with No. 400 Wetordry paper from this stage. Not more than 2 coats of dope should be applied without sanding. It is recommended that aluminum dope be used after these 5 coats of clear dope. Aluminum dope makes an excel-

lent base for any pigmented dope; it is a fine protection for the silk covering and the aluminum powder has a tendency to fill the miniature crevices in the finish.

If "blushing" occurs, a fine spray of thinner will usually remove it. "Blushing" is due to the moisture content of the air, and it is suggested that at least the final coats of pigmented dope be applied in quite dry weather. The weather may also affect the alignment of surfaces—particularly, alignment of the trailing edges of wing panels or tail surfaces in fabric covered structures. A surface held by a jig in proper alignment while the shrinkage of the cover takes place will often warp out of alignment long after the model is completed if subjected to rapidly changing temperature and humidity. For this reason jigs should not be utilized in this stage of scale model construction.

After 7 to 9 coats of dope have been applied to the surface with appropriate sanding (5 coats clear dope, 2 to 4 aluminum dope), the surface held up to a strong light should reflect all light rays uniformly. It should be impossible to determine the silver grey color by looking along the surface into such a light—the finish should appear to have what can only be described as a "liquid quality." Whenever this condition is met the model is ready for its final pigmented dope. If more than one color pigment is to be used on one part, a wing panel for example, masking tape is indispensable. It is suggested that the desired finish of one color be obtained before proceeding to the other color, and that the predominating color be applied first. With the possible exception of very light colors, 2 to 4 coats of pigmented dope will be sufficient.

For the final sanding No. 600 Wetordry paper is preferred although No. 400 can be used if sanding is done very lightly. It will be noted that all sanding dulls the finish, but the brilliance and lustre that only a smooth surface can have is easily restored by use of paste wax, fine rubbing compound, or if the surface is very smooth, by simply rubbing with a soft cloth. It is extremely important never to use rubbing compound or wax on any surface until all doping is completed.

This method of obtaining a fine finish on fabric covered scale models may seem unnecessarily long. Actually, however, it represents only a small percentage of the total time spent on a detailed scale model.

World War I

(*Continued from page* 38)

provided in previous designs by staggering wings or cutting away portions of the wings in the vicinity of the cockpit. British designers had for years been trying to improve the pilot's outlook and almost succeeded in 1916 with the back-staggered De Havilland 5 biplane. But the De H-5's bulging rotary engine plus its premature obsolescence failed to solve the problem. The ultimate sought was visibility comparable to that provided by such early pusher fighters as the F.E. 8 or De H-2 in which the pilot sat out in front of a central nacelle with all the land and sky before him unobstructed.

Design thinking on the Dolphin began as a scratch pad doodle in the engineering rooms of the Sopwith Aviation Company Ltd. during the summer of 1916. The doodling engineers pointed with pride at their thumbnail sketches of what might be if only a 190 hp water cooled engine were available to fill the bill. The only likely engine, built by Rolls Royce, had already been earmarked for other more

urgent types such as the Bristol Fighter.

Then, like a bolt from the blue, word came that Wolseley Motors had obtained a license from Hispano Suiza to manufacture their new 200 hp geared engine. With promise of an appropriate powerplant, the doodle soon became a purely engineering project and the forces of Sopwith immediately went to work on model 5F.1. It was nicknamed "Dolphin" in accordance with the Sopwith custom of naming their products after animals, fish or fowl.

The prospect of working up a design incorporating a water cooled engine probably appealed greatly to Sopwith's engineering staff. So far they had worked only on rotary engined planes for front line service. The new project, 5F.1, with its back-staggered wings offered new opportunity for great play of the imagination, a challenge to put everything into a single seat fighter that should be there.

Design and construction work progressed rapidly and on May 23, 1917 the Sopwith experimental department put its seal of approval on the 5F.1 Dolphin and turned the prototype over to stress and flight test.

Dolphin Prototype

In its original state, the Dolphin differed in a number of details from subsequent production models. The prototype and first few service test examples were characterized by a high and narrow nose radiator with the propeller shaft projecting through an appropriate hole in the upper half and a typically Sopwith vertical tail surface somewhat similar to that of the famous Camel. The engine, a revolutionary feature for a Sopwith airplane, was a water cooled Hispano Suiza type 8-B, geared 4 to 3 and rated a maximum of 206 hp at 2,000 rpm.

Generally, the configuration of the initial production Dolphin was little different from the prototype. Within limits of engineering changes they were the same dimensionally. But by late summer 1917, Dolphins which had been put on service test status demonstrated that while the design was inherently good, there was much to be desired by way of improvement before the airplane could be considered fit for front line service. Some trouble had been experienced at the factory in obtaining satisfactory radiators in quantity from an already overtaxed cooling system industry. The Dolphin exhibited, in addition, a tendency to spin violently under certain conditions, and it was found difficult to effect spin recovery. In addition, and somewhat more alarming, was the structural failure of Dolphin wings in several instances, some of which were fatal to the pilot.

Final Product

After months of experimenting and redesign, production was begun on a much improved Dolphin, the type with which the Germans were to become sadly familiar during the summer of 1918. Substantially the same as its prototype from all outward appearances, the production Dolphin's wings spanned 32 ft. 6 in., both with a chord of 54 in. Their combined total area, including ailerons, was 263.25 sq. ft. Gap was narrow at 51 in., giving a squashed down appearance. Dihedral of both wings was 2-1/2 deg. It should be explained here that a last minute rigging change was made which affected all Dolphins beginning with the fifth production model. Wings of the first four ships were set at 1-3/4 deg. incidence throughout and back-staggered 13 in. From the fifth ship onward, incidence was increased to 2 deg. throughout and stagger reduced to 12 in.

by moving the upper wing forward the difference. These changes were dictated by a relocation of the fuel tank in the fuselage to obtain a better center of gravity condition. It was intended originally to place the tank on the fuselage floor behind the pilot. With the fifth airplane, however, the fuel tank was placed directly under the pilot's seat.

Unbalanced ailerons with a generous combined area of 38 square feet were fitted to both upper and lower wings. Wings were braced by two pairs of struts on either side, the lower pair attached directly to the fuselage and the upper panels attached to a wood strut and steel tube center section structure which surrounded the cockpit and was left uncovered.

The Dolphin's unusually deep fuselage completely filled the gap between the wings with the pilot so seated that his eyes were on a level with the upper wing. Centered in the uncovered center section, he was able to see freely approximately 20 deg. forward over the nose; straight down to either side, front and rear except where vision was blanketed by the lower wing; full 360 deg. above the upper wing; and directly aft. Overall length of the production Dolphin was 22 ft. 3 in.

Procurement troubles with the prototype nose radiator were eliminated by installing right- and left-hand radiators outside the fuselage just above the trailing edge of the lower wing. This change actually improved the pilot's forward vision. The spinning and poor recovery characteristics of the prototype were corrected by re-design of the vertical tail surfaces into the peculiarly shaped fin and balanced rudder apparent in the accompanying photographs. These enlarged surfaces, in addition to removal of forward side area by eliminating the nose radiator, provided the Dolphin with excellent directional and spiral stability.

Performance

Performancewise, the production Dolphins left little to be desired for a 1918 service type. The first operational models officially weighed in at 1,406 lbs. empty and grossed 1,881 lbs. Fuel weighing 194 lbs., sufficient for a 230 mile range, was included in this gross figure. Wing loading in this condition was given as 7.3 lbs. and power loading, 9 lbs. At sea level the Dolphin clipped off 136 mph; 131.5 at 6,500 ft.; 128.5 at 10,000 ft.; and 124 mph at 15,000 ft. Its ceiling at this weight was 23,500 ft., and landing speed 40 mph. Times of climb to those altitudes were respectively 4.9, 8.25, and 14.7 min.

But like all other planes in either World War, the Dolphin was soon bulging with added equipment, more fuel and sundry things which increased its gross weight and knocked down its performance. One of the first additions of weight went into two movable Lewis machine guns mounted on the front spar of the centersection, augmenting the two standard synchronized Vickers guns in front of the pilot. Then came the addition of still more fuel, more ammunition, and finally oxygen for the pilot. And as its performance suffered, the Dolphin's most desired characteristics were balanced one against the other to recover the loss. The first things to go were the two centersection mounted guns and the oxygen. Actually Dolphins were flown at times with a gross weight of 2,018 lbs. as an approved gross, where the speed dropped to 111.5 at 10,000 ft.; climb to that altitude was increased to 11.7 min; and ceiling was reduced to 18,500 ft. On special occasions Dolphins were flown with gross weights as high as 2,300 lbs.,

but such a loading was not generally practiced.

Not all this performance loss was due to weight increases, however. Resistance of overhanging guns, flare shields, bombs, bomb racks and other equipment took their toll of speed, climb and ceiling.

Because of its effective ailerons area, the Dolphin possessed an excellent rate of roll and full lateral control down to and including the stall. In normal level flight attitudes all controls moved easily with little pilot effort. But at high speeds, as in a long dive, the rudder and elevator controls tended to stiffen up considerably, and too sudden pressure on the stick could pull the wings off. While flying straight and level, lines of the Dolphin made it appear to be tail heavy and it seemed to be flying level in a very shallow dive. This attitude fooled a great many German pilots because the Dolphin accelerated quickly in a dive and got into a fight more quickly than was expected.

As an all around single seater, the Dolphin exceeded anything the British manufacturers were able to put out in squadron quantities before W.W.I. ended. Other types perhaps bettered it in specific items of performance, but as a package the 5F.1 was hard to beat. It was different enough from the usual run of fighters that a special school was set up using 180 hp Dolphins as transitional or advanced trainers. Yet the 5F.1 possessed enough good characteristics that a 300 hp version was built and tested for production in 1919 and which the U. S. and French air services were contracting at the time of the Armistice.

These two models will be described and illustrated together with a structural analysis of the 200 hp Dolphin in these pages next month.

Plane on the Cover

(*Continued from page 26*)

"Ducks." Grumman, Swirbul and the Navy put their heads together and came up with the only solution: get someone else to build it!

The result was a new company, Columbia Aircraft Corp., located nearby in Valley Stream, Long Island. They were ready and willing to do the job, and the contract was signed at a time when Corregidor was falling and the Japs were steaming and flying in ever-increasing areas in the South Pacific.

The first airplane was completed in the summer of 1943 and production deliveries began in October. By the end of the year more than a dozen were in service and production was mounting.

But the old "flying shoehorn" wasn't through! The Navy *still* had a fondness for a type it had used for more than 20 years! One thing it was willing to give up was the singing wires and interplane struts of the biplane design.

Considerations of space limitations made it clear at the start that the fuselage location of the retracted landing gear was out of the question. This created a major design problem because of the midwing (and therefore high) location of the wing. The result was an awkward location of the main gear trunnions outboard on the wing with the wheels folding inboard and up into recesses provided in the wing lower surface. Location of the nose wheel in the tip of the "shoehorn" was a natural, however, although presenting a complex structural problem.

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Major design problem, though, was the wing. The Navy demanded a 50 ft. span, maximum, for carrier deck operations. Additional load of the four passengers meant increased weight with a restricted wing area and with the same engine specified! Within these narrow limits the Columbia design staff set to work.

The Columbia XJL-1 was completed in late summer 1946 and flew for the first time in the early fall. It combines the best of the old features—proved by time and some of the most unusual usage in Naval Aviation history—with the best of the new. It is powered by the famous Wright *Cyclone* R-1820 engine which, in its latest production version, produced 1350 hp for takeoff. This drives a Hamilton Standard constant speed propeller.

The XJL-1 has a 50 ft. span and is 43 1/2 ft. long. It stands 16 ft. high and weighs more than six tons fully loaded. It has a top speed past the 200 mph mark and can climb to 20,000 ft. It has a range of more than 2000 miles.

The pilot and navigator-radio-operator are located in the upper fuselage within a sliding canopy. The r/o also acts as gunner when protection is needed from enemy aircraft. The four passengers, or stretcher-cases, are located below within the hull section of the fuselage. Additional armament may be carried in the form of a medium-size bomb under each wing or depth charges for anti-submarine patrol work.

True to its tactical classification, the XJL-1 has utility, for it may be used for passengers, cargo transportation, scouting or observation work, courier service, anti-submarine patrol, aerial photography, ambulance service, over-water mercy missions—in short, about every duty that doesn't require tangling with enemy fighters, and about every duty that *does* require safety, ruggedness and dependability!

Newsletter

(*Continued from page* 10)

ings of A.M.A. he impressed everyone with his sincere efforts on behalf of the model builder and the splendid job he had done for aeromodeling in his home city.

Model aviation suffered an irreparable loss with his passing. It is hoped that the Akron program he helped launch will be continued as a memorial to Glen Rymer and his outstanding work.

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PIONEER GAS MODEL enthusiasts frequently feel lost in the swelling band of power plane flyers, and little wonder considering how the ranks of the motor maniacs have expanded within the past 10 years. Not long ago a charter member of the old International Gas Model Airplane Asso. (I.G.M.A.A.), the first big gas club, requested one of the "pioneer certificates" attesting to the fact he was an "early bird" builder.

Well, the gas modeler just hasn't any pioneers' organization like the full scale "Early Bird" or "Quiet Birdmen" clubs. Several times we have brought up the matter in these columns and have heard from several of the earlier experts. All were unanimous in their desire for some sort of recognition.

Realizing this, the officials of Air Age Inc., publishers of this magazine, have offered to issue "Early Bird" certificates to I.G.M.A.A. ex-members if enough desire them. Frankly, we think the response should be terrific. But to determine just how many chaps are still around and reading the mags, it is requested that those desiring such recognition drop a postcard to the Early Bird

Modelers, % MODEL AIRPLANE NEWS, 551 Fifth Avenue, New York 17, N.Y. On it give your name and address, when you started flying gas models, and what evidence you have now in your possession of that—preferably your I.G.M.A.A. membership card. Don't send this evidence until it is requested!

So act right away if you are one of the "oldtimers", and spread the good word around to any of your buddies who might qualify. Eligible are those who flew gas models prior to 1938.

* *

From England comes reports of the Third National Model Aircraft Exhibition sponsored by the London newspaper, *Daily Express*, and the *Aeromodeller* magazine, and held in Dorland Hall in London. This turned out to be a wonderful show and exhibit. Highlight of the affair was the display of new diesel engines which are fast taking the play away from standard ignition motors. Some 15 different diesels are being readied by various British manufacturers, and in a recent international meet at Eaton Bray, England, entrants from the continent (France, Belgium, Czechoslovakia, Denmark and Holland) stole the show with their highly perfected compression-ignition engines.

An outstanding feature of the London show was electric "round-the-pole" flying in which remotely operated control line models made exhibition flights powered by electric motors. Current is supplied to specially made electric motors through the tether wires and most of the models hit a speed of 12 to 20 miles per hour—sufficient to become airborne and fly under control.

We will have a first hand account of the exhibition and British modeling in general when C. S. Rushbrooke, editor of *Aeromodeller*, arrives in America soon on a goodwill mission to American modelers. M.A.N. Editor Howard McEntee is arranging for Mr. Rushbrooke to visit various model clubs in the New York area, and it is expected that a series of informal luncheons and dinners will serve to acquaint the wellknown English author, designer, builder and editor with American modelers and American model activity.

Simplex 25

(*Continued from page 28*)

and just run it back and forth a few times, then wipe again. Repeat this half a dozen times and the bore is lapped. The main consideration is that the barrel should be straight or very slightly bellmouthed toward the bottom. If the barrel is ground you should have no trouble to achieve this; but if it is lapped, it is advisable to make a plug gage out of brass or any metal which is handy and test the amount of taper with it. You can actually check for the degree of compression the piston will have.

Tap the sparkplug hole and file in the exhaust ports while the piece is held in the lathe. Be careful when filing the ports because if they are not evenly spaced there will not be sufficient space for the transfer passages. If the particular lathe you work on has an indexing arrangement this will be a great help. The exhaust ports are 1/8" high and 7/16" wide.

Round off the cylinder fins to the proper shape with a smooth file before tackling the next job, that of cutting the bypass or transfer passages.

The bypasses can be made in two ways: They can be ground in with the tool-post grinder, using a 3/8" diameter wheel; in this case the work does not have to be removed from the chuck. A quicker way is to mount the work in the milling attachment and make the cuts with a 3/8" endmill. If the latter method is used, mark the work before taking it out of the chuck so you can get it running fairly true when it is rechucked to make the two small steps at top of the cylinder

and to cut off. The bypasses are 1/32" deep and extend 41/64" into the cylinder. If they are made by milling, the cutter and work should be set so the full 1/32" depth can be made. Then run the work toward the headstock so the end teeth of the mill will do the cutting.

PISTON—The piston is also made of Meehanite. Mount the remainder of the Meehanite bar in the chuck and drill in ¾" deep with No. 20 drill (.161), then bore the hole to .615" diameter and ⅝" deep. Now cut down the outside diameter to within a thousandth of the size of the plug gage which was used to check the cylinder box. The last thousandth of an inch can be taken off gradually with emery paper. Frequent tries into the cylinder and checks with the micrometer are necessary to get a good fit. As the plug gage goes up to the top of the cylinder the size of the bore is known at that point. If piston goes in the cylinder as far as the ports it is satisfactory for the time being. At this point the piston should be cut away from the Meehanite rod with a parting tool.

SOCKET—Use the ¾" aluminum for this part. Do not forget that the top nipple should be a good fit into the hole at top of the piston. The outside diameter of the socket is 19/64" and the hole is made with a No. 3 (.213) drill; the hole depth is 3/16". The socket may now be riveted into the piston, and for this job the socket closing and holding tool is employed. Insert the aluminum fitting in place from the inside of the piston and put the pointed end of the tool against it inside the piston. Rivet the nipple on top of the piston, taking care not to hit the piston with the hammer as this may knock it out of shape or even break it. If the nipple was made a snug fit into the hole it will not require much riveting to produce a firm anchorage.

CONNECTING ROD—Before the connecting rod can be started, a form tool to cut the two different sizes of balls at the ends of the connecting rod should be made.

Plans for this tool will be seen at top of page 29 and are shown double size for clarity. First the ⅜" square cold rolled steel is mounted in the milling attachment and center drilled ⅜" from each end, after which the holes are bored through with a small drill, say about No. 30 (.128). The work should be turned to 10 degrees more than right angle to the drill so as to produce proper clearance when it becomes a cutting tool. The final holes are made with No. 3 (.213) and F (.255) drills. Now the end is either ground or filed until exactly half of each hole is removed; then two edges are further cut away to the measurements shown on upper (top) view of the tool. It is important that this tool be reproduced exactly, otherwise the ball ends on the rod cannot be made properly. The smaller hole will make the ball which acts as a universal joint. This ball will be made first so the right lip of the form tool (as it is placed in the lathe) should be left even with the middle of the hole; the other side should be ground shorter, as the drawing shows, to allow for half the thickness of the connecting rod itself. The end which is to form the larger ball should be made just the opposite way since the connecting rod will be at right of the cutting tool when this ball is made.

The finished tool should be surface hardened in *Kasenit*. This process, which is also known as case hardening, is very simple and can be accomplished at home with a gasoline blowtorch or even on the

kitchen gas stove. The tool is simply heated to a bright red, the ends dipped in the *Kasenit* powder, then reheated again and plunged in cold water. This produces a very hard skin on the tool, but the metal beneath this skin retains the original characteristics of the steel. The powder can be had at modest cost at most large hardware stores and is entirely safe to use since it is non-poisonous and gives off no noxious fumes.

Chuck the ⅝" cold rolled piece with about 1½" sticking out of the chuck and turn down the outer ½" to about the size of the small ball. Now put the form tool in the tool post and move it straight in very slowly to make the small ball, moving the tool forward until a check with the micrometer shows the ball to be a trifle over .213" diameter. After the ball has been formed, smooth it well using very fine emery cloth. With a pointed bit cut down the connecting rod at left of the ball to about 9/64" dia. and an inch in length; then loosen the chuck and pull the work out another ½". Now cut down the portion nearest the chuck to the approximate size of the larger ball. Measure 1⅜" from center of the small ball and mark the rod. Also make another mark at 1¼" from the ball center: this is where the connecting rod shank ends. Turn the rod down to 9/64" dia. at the 1¼" mark, then use the form tool to make the larger ball. The connecting rod proper between the two balls can be filed to a slight taper (about .007) and the piece cut off.

File two flats on the large ball until the thickness is reduced to 11/64", center-punch the middle, first checking the 1⅜" center distance again to get the exact spot for the punch mark, center drill the punch mark, then bore through with a No. 17 (.172) drill. The wall will be little more than 1/32" thick so be careful to have the hole centered. Harden the drilled ball in *Kasenit*.

We are now ready to assemble piston and rod. For this job the hollow end of the socket closing and riveting tool is used. Insert the small ball of the connecting rod in the aluminum socket and put the tool over the connecting rod. Lay the piston top down on an anvil and strike the pointed end of the tool a few light blows and the socket will be closed neatly.

INTAKE TUBE—First make the intake tube out of the ¾" aluminum; a piece about 1½" long should be used. Place in the chuck sideways and adjust so that the long axis of the piece is centered. Spot with the center drill and bore a hole slightly smaller (about .001") than the outside diameter of the main bearing so it will be a very tight press fit. Now chuck the work the conventional way and drill the intake tube hole which is ¼" (the F drill will do for this). Cut to length and round off the bottom with a file as neatly as possible. Press the intake tube on a frontplate so the intake hole will be ¾" from the rear of the crankshaft thrust bearing. An ordinary vise will be useful for this job.

Hold this piece in the milling attachment by the square portion and drill the ¼" intake hole right through the bearing. Insert the crankshaft and spot slightly with the center drill. Then remove and drill through one side of the shaft into the hollow center and not touching the other side. Follow up with a No. 1 (.228) drill. Before you try to insert the crankshaft in its bearing, again file off the burr so it will not score the inside of the bearing.

FINISHING—The rest of the work is mostly adjustment and assembly. It may be necessary to shave a little here and there but if the proper step by step procedure is followed, everything will come out all right. Insert the crankshaft, line up the two intake holes and, looking from the rear of the shaft, put a scribe mark 45 degrees to the left of top center and crossing the groove made to locate the crankpin. Center punch where the two lines meet and make a hole with a No. 19 (.166) drill. Make the crankpin out of a piece of 11/64" drill rod about 3/4" long. The crankpin must be a drive fit in the crankshaft hole. If a new drill is used to make this hole it will probably be advisable to use a No. 18 (.169) drill instead of the No. 19 specified. At any rate there should be an "interference" of 2 or 3 thousandths between the stock used for the pin and the hole diameter. The pin can then be driven in without damaging either piece, yet it will never work loose. After driving it through the counter balance, cut off so the projection is 11/64" long.

Cut the timer mounting ring, leaving the hole in the center a thousandth or so small so that this part, too, will be a press fit on the front plate. Force it on far enough to leave 3/8" for the timer case. Now file the 3/16" wide slot in front of the main bearing in which the timer spring actuates. This slot goes diagonally at 30 degrees from left bottom to right top as viewed from the front and is cut half way through the bearing. The cam slot in the crankshaft should coincide with it when the crankpin is at top of the stroke. However, the latter slot is only 1/32" deep so it will not break through the wall of the shaft. Harden the front part of the shaft in *Kasenit* so that the timer action will not wear away the cam edges. At the same time harden the crankpin as it will "pick up" and seize if left soft. Before hardening the latter, however, make sure the pin is an easy fit in the connecting rod. There may even be a slight looseness here to allow for misalignment of various parts.

Drill the hole for the needle valve (No. 30 drill if you are using a *Forster* part) in the intake tube. Drill and tap the hole for the 3-48 screw which holds the timer in place and allows it to be moved to change timing. This hole can be marked off through the slot in the timer case when the latter is held in place against the timer mounting ring.

The hole should be marked centrally in the timer case slot. Rotate the timer until the contact points just open when the crankpin reaches top center position. The crankshaft must, of course, be turned counter-clockwise as viewed from front of the motor to determine the position where the points open.

If it is found, when the motor is tried out, that the speed is still increasing when the timer lever reaches maximum advance position, a new hole can be made to allow even more advance.

We are now ready for final assembly. Slide the piston into the cylinder; if it is too tight, make a wood mandrel which will tightly fit the inside of the piston and use very fine emery paper again with the piston turning in the lathe. Just as soon as you get it so it slides above the ports, go very easy and try it often so as not to make it too loose. When it goes in all the way, screw the cylinder into the case with the piston, frontplate and crankshaft properly assembled. Note position of the piston with crankpin at bottom center. If it stops with the top even with the lower edge of the exhaust port, all is well;

HELICOPTERS—

LEARN more about building models of the fascinating whirligigs . . . from R. L. Clough who has built dozens of different types. His newest ideas will appear in the May issue of MODEL AIRPLANE NEWS. . . *On Sale at all Newsstands April 8.*

but if it goes below this you will have to face a bit off the top of the crankcase neck to get it in line. When the cylinder is tightened into place the exhaust ports should be on each side of the engine. Due to the fact that a quarter turn of the cylinder moves it only .007 vertically, a few thousandths more or less will bring the ports around to the right spot. If the piston stops above the exhaust ports, raise the cylinder by putting a washer between it and the neck of the crankcase.

If the various parts of the motor have been accurately made the compression ratio should come out to about 5-1/2 to 1, which is about midway between high and low. The chucking stud may be cut off just as soon as the engine turns over smoothly and feels as though it is going to have good compression; however, it is better to be cautious and keep it on until the engine is ready to be installed in an airplane. It is very handy when the engine is being broken in as no mounts are needed—just clamp the stud in a vise and the engine is ready to run.

Install a V3 sparkplug and use at 2 to 1 mixture of white gas and No. 70 oil while the engine is getting its sea legs; and do not run at full advance as the top of the piston expands more than the cylinder barrel and might seize up. This will do no serious damage to the engine but it may loosen the aluminum socket a little, a fault which shows up in a sudden loss of compression. Should this occur, all you have to do is re-close it with the socket closing tool.

Mounting the engine should be done radially, with metal brackets fastened to the screws holding the gas tank in place. Alternately, angles can be fastened to the sides of the case for normal beam-style mounting.

As with any engine, its efficiency and even its length of service depend entirely upon the care with which it is broken in. Run it slowly, use only the best oil and gas, and disassemble and clean the engine thoroughly after each half hour or so of running until it is thoroughly loosened up and ready for real work.

(Needless to say, we will be very pleased to hear from readers who have built this engine, or to help those who have run into difficulties. If there is sufficient interest in material of this sort, more will be presented in this magazine in the future.—Editor.)

Flash News

(Continued from page 6)

ed in the nose. The XF2R-1 is powered by a General Electric TG-100 gas turbine driving a four-bladed propeller encased in a long, sharknosed spinner. The propeller is of the "square tip" design. The new power unit increases length of the *Fireball* by four feet, and this additional area forward of the center of gravity has required installation of a large dorsal fin forward of the rudder to provide the required lateral area. A feature of the turboprop unit is the fact that after driving the propeller, about 25% of the available power remains for jet thrust through exits on either side of the nose. The tail unit remains a General Electric I-16 unit as in the FR-1. Advantage of the turboprop unit lies in retention of the propeller with its fast acceleration (for takeoff and rapid climb) while making available the "constant thrust" characteristic of the gas turbine. The XF2R-1, even more than the FR-1, is thus an "all altitude" fighter plane with substantially the same amount of power available at its ceiling as is available at

sea level. As in the case of the XF15C-1, the XF2R-1 is not slated for quantity production at present but both will be used for intensive development work as guinea pigs for future fighters.

IT MAY NOW be revealed that the potent North American XB-45 jet bomber has been completed for several months, but delays in delivery of the engines have forced temporary cessation in work on the craft. It is a midwing bomber with a single rudder and is powered by four General Electric TG-180 axial flow turbo-jet engines mounted in pairs in nacelles in the wing. The bomber is said to be in the 600 mph class.

ONE OF THE strangest aircraft ever built in America is the new Boeing L-15 two place liaison airplane under development for AAF. In general appearance it looks as if an engineer took the gondola from a Goodyear blimp, turned it around, added wings and an upside-down twin tail assembly on a boom and called it an airplane! However, the L-15 is a carefully designed answer to the liaison aircraft problem to which the wartime *Grasshoppers* supplied only a partial answer. The strange design will fly at less than 50 mph, take off and clear a 50 ft. obstacle in 600 ft., and land in less than 250 ft. It is powered by a Lycoming 125 hp engine mounted tractor-style in the nose. The observer is located in a glass enclosure allowing nearly complete vision throughout a full sphere of observation. The L-15 has been designed for versatility: it can be towed as a glider to the operating area, thereby conserving fuel on the way out; it can be equipped with skis and a special fitting can be attached to enable it to operate from an overhead cable in the jungle. Another special feature is the fact that it can be quickly disassembled and loaded into standard 2-1/2 ton Army truck!

MANY SIGNS point to a projected round-the-world record-breaking attempt by Republic *Rainbow* transport this summer. Company and Army engineers are said to have estimated the total time as only 46 hours including stops in Paris, Karachi, Tokyo and Fairbanks. There is little doubt that the 400 mph craft can do the job under proper conditions, but there will be many days of waiting, checking and predicting to chose that one particular takeoff day when the weather is "just right!"

Flyabout

(Continued from page 23)

cylinder head can be made by wrapping fine wire on a nail. The twin-ignition sparkplugs on the forward side of each cylinder head are small pieces of balsa. The cylinder units are cemented on the nose block as shown on drawings at 120 degrees apart. Carve the instrument panel block from soft balsa and cement in position as the next step.

To complete the fuselage, cut from 1/32" sheet balsa the six stringers required which extend along the fuselage sides, cementing them in their proper locations as shown on plate 1. Also install the piano wire tail skid of No. 15 wire on the fuselage tailpost, making sure of good adhesion.

WING—The wing is relatively simple to build. Cut the 18 required ribs from 1/32" sheet balsa. Notch each one for the

two main spars. The leading edge is a length of 1/8" x 1/4" stock, sanded to proper crossection later. Instead of building the wing in one piece, each half is constructed separately, both being joined later with a cemented butt joint. Select good hard stock for the spars. The front one, in two sections of course, is 1/16" x 5/16" balsa. The rear spar is 1/16" x 3/16".

As will be noted, two false spars are included, each pair being the length of the ailerons. Cut the forward pair from 3/32" x 5/16" material, and the rear set from 3/32" x 3/16" balsa. The trailing edge is 1/16" x 3/16" stock; notch it for the ribs. To build a wing half, slide the necessary ribs on the spars in their approximate positions. Pin the two spars to the working surface followed by the trailing edge. Raise all three members on blocks the necessary distance from the workbench surface as required. The ribs are then placed in their correct locations and cemented.

At the fuselage end of each wing panel there are two spar sections between the first two ribs, each the depth of the airfoil section in their respective locations. Install these, then cementing the overhead window in place (.010" celluloid), following the contour of the ribs. Now cement the leading edge against the ribs, sanding it to section shown when dry. Next cut a pair of wingtips from 1/32" sheet balsa and install. Each aileron is installed with soft copper or iron wire as shown. Put 1/2" dihedral in each wing panel (at tip) by cutting the leading and trailing edges where indicated, after wing frame has become a one-piece unit. Use cement and reinforcing balsa blocks to securely fasten the material which has been partially cut through.

TAIL SURFACES—The empennage is of simple construction yet rugged in service. Fin and rudder spars are 1/16" x 3/32" balsa, while the ribs are merely 1/16" sq. strip balsa. All diagonal crossbracing is of 1/32" sq. bamboo. To form the edges, use No. 18 aluminum wire, bent to correct outline with the fingers as it is worked around from one end to the other. Finally, connect the fin and rudder with the same hinge wire used for the ailerons.

The stabilizer is of the same general construction as the vertical empennage. It consists of 1/16" x 3/32" stock for all edges and spars. The ribs are also of 1/16" sq. balsa, and 1/32" sq. bamboo is again used for crossbracing. To complete it, connect the elevator to the horizontal stabilizer with the wire hinges.

LANDING GEAR—This unit is of bamboo construction. In building it, use 3/64" x 1/16" bamboo, sanded to approximate streamlined section. Where each strut is cemented to the fuselage, use cement freely to effect good unions. Proceed to cement the three struts together at the axle after the fuselage attachment. To complete it, make two axles from No. 15 piano wire as shown on plate 2. Where attached, they are to be bent in a "U" shape and then wrapped with thread and cemented. The 3/4" diameter wheels, of the air-wheel type, can be purchased from any model supply house, or turned from balsa if desired. Hold wheels on with a small drop of solder.

PROPELLER & MISC. STRUTS—Carve the propeller from medium-hard balsa. First blank it out as shown on plate 1. After it has been carefully sanded to a good finish, upon completion of the carving of the blades, drill a hole through the hub to accommodate the No. 15 piano

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wire shaft, which is inserted in the propeller later.

The main wing struts are made from 1/16" x 1/8" hard balsa, each being sanded to a streamlined crossection. The small inner brace struts between the main struts and wing are made from 1/32" x 1/16" bamboo. Notice that a diagonal drag strut of the same size bamboo is included in the group (see dotted line across side window of cabin—side view of fuselage on plate 1). The brace struts for each side of the stabilizer are also made from 1/32" x 1/16" bamboo. All struts, now ready to install, are laid aside until covering is completed.

COVERING & ASSEMBLY — Colored tissue should be used to cover the model. Begin with the fuselage, which should first have installed the side cabin windows, cut from .010" sheet celluloid. It is suggested that the fuselage be a dark color, using a lighter contrasting color for wing and empennage. Proceed to cover the wing and tail surfaces in the usual manner. Now give the paper its primary tautness by spraying with water, following with a light coat of clear dope.

The assembly may now be started. First paint the interior structure of the cabin, with a selected colored dope, including the instrument panel block. Also paint the engine at this time, giving it two coats of glossy black dope. Cement the wing in its correct position on the fuselage. Cut five lengths of No. 12 piano wire which forms the windshield frame between nose upper cowl and wing leading edge. One is in the center, while the remaining four are grouped in two sets as shown. Make and install the dummy balsa gas tank cap on its 1/32" sheet balsa base. Determine the windshield template, using paper. After getting it to correct outline (flat development), make the windshield itself from .010" sheet celluloid. To install it, first cement it to the center brace, using pins at upper cowl and wing leading edge temporarily, and work each half around to the fuselage sides, cementing well and using pins until dry.

Proceed with the assembly by next installing all the wing struts previously made. Cement the horizontal stabilizer in position in the slot provided. The stabilizer struts (one is on each underside of the stab.) can now be cemented in position. The vertical fin and rudder assembly are now cemented on top of fuselage, taking care that it lines up correctly with the horizontal stabilizer. The thread bracing on the tail, also the dummy elevator and rudder control cables, should now be cemented in place. Use gray thread for these. Each should be strung as taut as possible, being pinned in place under tension until cement is dry.

Next paint the wing and tail struts with a properly colored dope to match your paper color scheme. The propeller shaft with hook bent in it is now slid forward from rear side of the nose block through the block and propeller. Insert two small brass washers between the two in this operation. Bend the shaft over and sink it in the propeller hub, using cement.

BALANCING AND FLYING — First glide the model after ascertaining that it is in approximate balance. Bend the elevators down slightly to compensate for a slight stall. Should it require more nose weight than the elevators can counteract for, cement a small piece of solder on rear side of the nose block. When gliding properly, install 2 to 4 strands of 1/8" flat rubber, giving the propeller a few turns only for a trial flight. If satisfactory, proceed to wind it to capacity.

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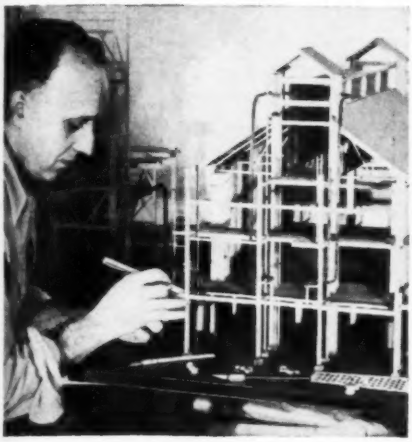

Makes Super-Furnace With Super-Knife

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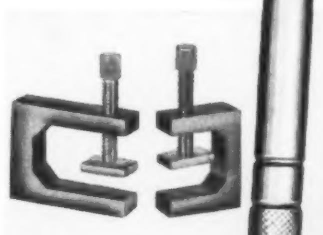

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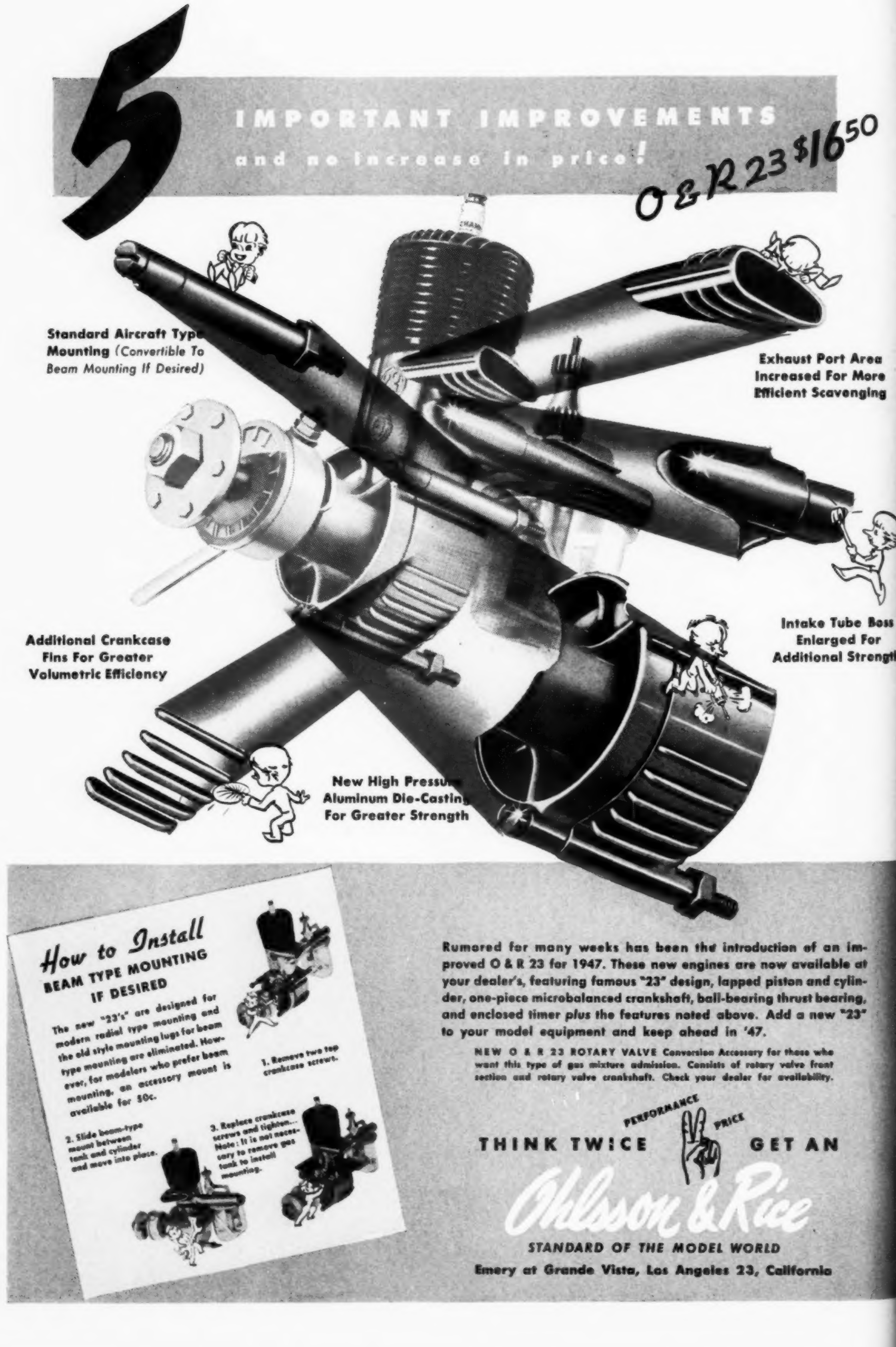
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The new "23's" are designed for modern radial type mounting and the old style mounting lugs for beam type mounting are eliminated. However, for modelers who prefer beam mounting, an accessory mount is available for 50c.
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2. Slide beam-type mount between tank and cylinder and move into place.
3. Replace crankcase screws and tighten... Note: It is not necessary to remove gas tank to install mounting.
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